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THE
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POLYNESIAN NAVIGATORS: THEIR EXPLORATION AND SETTLEMENT OF THE PACIFIC

By ELSDON BEST
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[With separate map, Pl. I, facing p. 176.]

Apart from Indonesia and the off-shore islands extending northward to Japan and Sakhalin, the far-flung island system of the Pacific is usually divided into four ethnic areas, Micronesia, Melanesia, Polynesia, and Australia. The first of these embraces the Ladrones, the Carolines, and some adjacent groups, inhabited by people of apparently mixed origin but containing a small community of Polynesians at Monteverde, or Nukuoro, Island. The region of Melanesia lies between Micronesia and Australia, extending from the western extremity of New Guinea eastward to the Fiji group and including New Caledonia. These islands are occupied by dark-skinned peoples differing widely from the Polynesians, but isolated communities of Polynesians are found dwelling within the area. From the Fiji group eastward lie the innumerable isles of Polynesia, inhabited by a light-skinned folk described as white people by the early Spanish voyagers. This race has also peopled New Zealand and the Ellice group, thus leaving Fiji as a Melanesian projection into Polynesia. The adventurous Polynesians have settled as far north as the Hawaiian Islands, and their eastern outpost is lone Easter Island. The Australian area is confined to Australia, Tasmania, and a few isles near the Australian coast. Its native population is quite distinct from the peoples of Indonesia and other island regions and belongs to a lower culture stage; in no part do these aborigines practice agriculture.

It appears probable that the natives of Australia and Tasmania have occupied their area for a longer period than those of Melanesia have been in possession of the islands where we now find them. The Melanesians, who are by some writers divided into two ethnic groups, must, however, have

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been settled in their present area for a very long period, considering the great number of languages that obtain in that region. The Polynesians appear to be the late comers of all these scattered peoples, and, if their traditions and some other factors be taken into account, they have been the most adventurous on the ocean and have traveled the farthest from their original habitat.

The origin of the Australian natives is an unsolved mystery. If ever they possessed any knowledge of constructing deep-sea vessels and of the art of navigation, then they have lost such knowledge with great completeness. The Melanesians we know as a non-adventurous folk, averse to long sea voyages, though constructing sea-going vessels in many cases. Thus the Tongans (Polynesians) adopted the Fijian (Melanesian) double canoe, as being superior to their own, and made many voyages to the Fiji group, but Fijians never made the voyage to the Tonga Islands unless some Tongans accompanied them. If ever the Melanesians have been daring voyagers, then they have certainly lost that distinction for many centuries. The Micronesians appear to have excelled them as navigators and constructed remarkably swift sailing craft, the famous *prau*. It can, however, be shown that neither the Micronesians nor yet the Malay sea rovers of Indonesia possessed the energy, courage, and self-reliance of the Polynesians when it became a question of daring the unknown and lifting the long water trails of the vast Pacific.

As an illustration of the confidence and daring of Polynesians when abroad on the ocean, a paragraph in local New Zealand newspapers of February, 1917, is apt and also the most recent of instances. The natives of Pitcairn Island, in eastern Polynesia, descendants of Tahitian women and mutineers of the *Bounty*, lately built and launched a schooner 44 feet in length. With a crew of fifteen she was sent on a thousand-mile voyage to Mangareva and Tahiti. She carried neither chronometer nor chart, but her crew sailed with a sublime faith in their ability to reach their destination and return safely to their little home island. When launched the vessel struck a rock and was leaking when she put to sea, but her crew counted on effecting repairs at some island during the voyage to Mangareva.

Predecessors of the Polynesians

In view of the evidence that the Polynesians were comparatively late comers in the Pacific, the question of prior inhabitants of that part of the island system known as Polynesia is of interest. Those who have studied the question of the origin of the Polynesians and of their original homeland, such as Judge Fornander and Mr. S. Percy Smith, seek to show that they came from southern Asia and that they reached the present Polynesian area early in the Christian era, about the fourth century. Is it possible that the great number of islands east of the Melanesian area was uninhabited at that period? It does not seem probable, when we consider the evidence of drift

voyages, not to speak of the antiquity of the human race. These unlettered peoples have preserved but little evidence to be scanned and seem to possess no clear tradition as to former inhabitants. The most remarkable is that of the natives of Easter Island, a legend which states that, when their ancestors reached that lone isle many generations ago, they found it peopled by a strange "long-eared" folk, who were destroyed in after days. These "Long Ears" are supposed to have been the people who employed the peculiar script found incised on wooden tablets, a curious series of symbolic or hieroglyphic characters found nowhere but at Easter Island and apparently arranged or written in a boustrophedon manner. There is no evidence to show that the Polynesians ever possessed any form of script or had any knowledge of metals. The so-called translations of the Easter Island inscriptions are open to grave doubt.

Among various branches of the Polynesian race exist traditions of an old-time people called Manahune, who appear to have occupied an inferior position. It is just possible that these Manahune were a survival of a pre-Polynesian folk, but there is little evidence to go upon.

At the same time it is but just to state that we are very slow to acquire knowledge of past events in the history of native peoples, albeit such natives may possess fairly clear traditions on the subject. For many years it was believed that New Zealand was an uninhabited land prior to the arrival of a considerable number of Polynesian immigrants some twenty generations ago. Further inquiries, spread over many years, led to the publishing of many traditions concerning the coming of a previous company of Polynesian settlers some eight to ten generations before the advent of the above-mentioned immigrants. Again, it is but a few years ago that traditions existed among East Coast natives that, when the first Polynesian settlers arrived on these shores, they found a strange folk of inferior culture in occupation there. These original settlers may have been Melanesians, but it is generally thought that they were a mixed race caused by the intermingling of Polynesians and Melanesians. The traditions concerning them are dim with age.

It is just possible that further information on the peopling of Polynesia may yet be obtained. Meanwhile, if we are to accept the above-mentioned date as to the arrival of the Polynesians in the Eastern Pacific area, then we must assuredly regard statements to the effect of their being the first inhabitants of that area with considerable doubt.

Traditional Origin of the Polynesians

Hawaiki

Apart from traditions of local movements, settlings, resettlings, and hiving-off migrations, the various branches of the Polynesian race maintain that their remote ancestors dwelt in an extensive land lying far to the westward. From this land they migrated to the eastward, eventually reach-

ing the islands where they now abide. It is a noteworthy fact that these islanders all locate the spirit land in the west; in fact the spirit world and the original homeland of the race are apparently confused and are often spoken of as though one and the same place. This is specially noticeable in the lore of the Maori of New Zealand, who speak of the ancient homeland as Hawaiki. The inner teachings, however, of former priestly adepts disclose the fact that Hawaiki was not the name of the fatherland but of a sacred place there to which all spirits of the dead proceed on the death of the physical basis, the body. From that central place such spirits separate and go to two different spirit worlds. The spirits of those who sympathize with the Earth Mother descend to Rarohenga, the subterranean spirit world; while those whose sympathies are with the Sky Parent, Rangi, ascend by means of the whirlwind to the upper spirit world. Such sympathies are connected with the violent separation of these primal parents in the days when the world was young, when they were forced asunder by their rebellious offspring.

So strong a hold had this name of Hawaiki on the imagination of the Polynesian that he carried it with him in his wanderings athwart the Pacific and applied it to many islands, and it is found in various forms, according to dialect, as Hawaiki, Hawaii, Avaiki, Savaii, etc., from the Hawaiian Islands to New Zealand. Both Raiatea and Tahiti seem to have been known as Hawaiki in former times, while New Zealand was known to the natives of south-central Polynesia as Hawaiki-tahutahu.

Irihia

According to traditions preserved by the Takitumu clans of the Maori folk of New Zealand, the original homeland of the race was a great land named Uru. From this land the ancestors of the Maori migrated to another land named Irihia, situated eastward of Uru. Irihia had a remarkably hot climate and was inhabited apparently by several different races, among whom a very dark-skinned people were remarkably numerous. A famous vegetable food of that land was called *ari*. As to what land this was we can only conjecture, but it is of interest to note that an old Sanskrit name for India was Vrihia (possibly connected with Sanskrit *vrihi*, rice), which any Polynesian would certainly pronounce as Irihia.

Eastward Wanderings

There is no means of determining the length of the Polynesian sojourn in Irihia, or rather of the people whose descendants became Polynesians. Tradition states that they became involved in war with dark-skinned aborigines and suffered so grievously that they, or a portion of them, left Irihia and sought a new home across the ocean. They steered toward the east, guided by the heavenly bodies during the day and by the stars or the cool, damp sea breeze at night. Eleven days' voyage brought them to a land called by them Tawhiti-roa. Here they appear to have dwelt for some

time, until wars again forced them to take to the ocean. Sailing to the eastward they reached another land, known to the Maori as Tawhiti-nui, an extensive land, where they went up a great river and settled on its banks. This sojourn is said to have been a long one. Here they became a numerous people, but, apparently, war again caused them, or some of them, to seek the sea roads in later days. In the time of Ira-panga they came, ever seeking the rising sun, and no further halts are mentioned, though probably they called at many isles, until they arrived at the islands of Ahu, Maui, and Hawaiki. Mr. Percy Smith identifies these isles with those of (O)ahu, Maui, and Hawaii of the Hawaiian group, but it is well to note that the same names occur in the Society group, where several small islets are called Maui, while Hawaiki seems to have been an old name for Tahiti. As for Ahu, we are told in Maori tradition that Ahu, Ahuahu, and Tuhua were all names applied to the one island, identified with Maitea Island, east of Tahiti.

Wherever the ancestors of the Polynesians may have originally dwelt, it is clear, from many traditions of widely separated branches of the race, that they came from the west. The Polynesian communities met with in Melanesia and Micronesia may have been left behind by the original migrants or they may represent a backwash from Polynesia, the result of drift voyages.

The Vessels of the Voyagers

Method of Construction

A curious and interesting passage in the old tradition of the migration from the land of Irihia describes the manipulation of the vessels at sea and the procedure adopted on the approach of rough weather. Not only is the use of sea anchors and an awning or covering for the long boats mentioned, but also the use of the double outrigger seems to be alluded to, and, what is most singular, these seem to have been carried inboard in calm weather and only fixed on the approach of a storm. This seems a somewhat improbable procedure, and there exist no means of verifying the statement.

We are told that the migrants always steered in general toward the rising sun, but that small parties occasionally broke off and pursued other courses.

After the arrival of these wanderers in the central and eastern areas of the Pacific Ocean, they evidently still followed their roving habits and became probably the most amazing deep-sea voyagers the world has ever known. In order to grasp this fact two important matters must be remembered: In the first place, these voyagers had no knowledge of the compass and its uses; and, secondly, their ignorance of the use of metals was another serious handicap in the construction of vessels. The vessels employed were of two kinds, the double canoe and the outrigger canoe. This term canoe is somewhat of a misnomer and, to some extent, misleading. The Polynesian

vessel resembled the prau of Indonesia and the Caroline group but differed somewhat in form. Generally speaking, their construction may be described as a dugout hull with one or more top-strakes added to its sides. The work was done with stone tools, and the craft were carvel-built. In some cases, where timber was scarce or trees were of small size, the dugout hull was only a shallow trough, the sides being built up of several tiers of planks, sometimes of short length, demanding much careful labor in join-

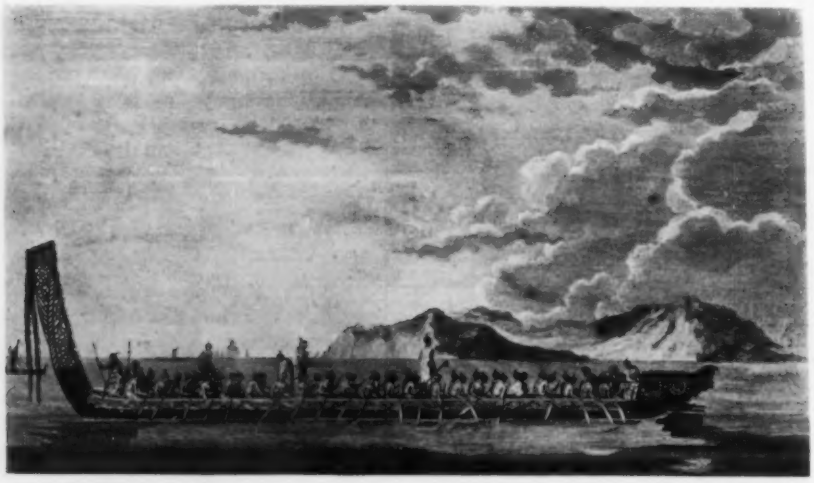

FIG. 1—*Waka taua*, or Maori war canoe. (From an old Dutch cut copied from Pl. 16 of John Hawkesworth's "An Account of the Voyages Undertaken .... for Making Discoveries in the Southern Hemisphere .... by Commodore Byron, Captain Wallis, Captain Carteret, and Captain Cook," 3 vols., London, 1773.)

ing. In islands providing large-sized trees, dugout hulls of great length and considerable depth, requiring but one top-strake, were made, as we see in New Zealand. When a hull needed lengthening, an additional piece, or pieces, was hewn out and lashed on, in which case rigidity was imparted to the hull by means of carefully fitted and secured top-strakes.

DIFFERENT FORMS

The range of the outrigger is a matter of some interest and may point to a distribution from the vicinity of southeastern Asia. It is found on the coast of India and eastward across the Pacific Ocean to the far-off isles of eastern Polynesia. It is also in use on a stretch of the east coast of Africa, and its use there may possibly be owing to the same cause that introduced the Polynesian numerals into Madagascar. Elsewhere in Africa it is not used, neither was it known in America.

Both the single and double outriggers are found in the Pacific area, the former predominating, it being the common Polynesian type. The Polynesian voyagers employed both the double canoe and the outrigger, and we have evidence that both forms were introduced in New Zealand. In these

islands, however, both forms fell gradually into disuse. Tasman seems to have seen only the double canoe on New Zealand shores in 1642, but when Captain Cook arrived there, in 1769, he found that a change had taken place. He saw but one double canoe on the coasts of the North Island, but a considerable number at the South Island, while but few outriggers were seen. It was probably owing to the large size of the timber trees in the islands, and to the fact that the Maori of New Zealand had given up deep

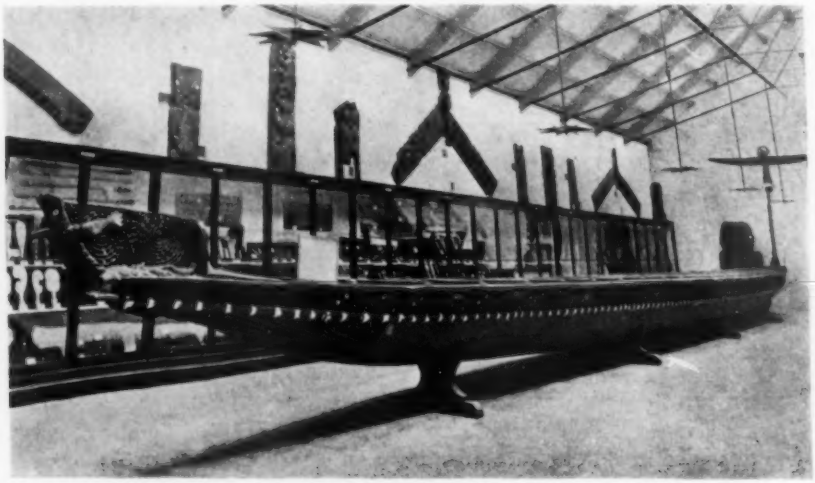

FIG. 2—A Maori canoe named Te Toki-a-tapiri (Auckland, N. Z., Museum). Length, 83 feet; beam, 7 feet. The hull is hewn out of one log, save the small headpiece. The join of the top-strake and hull is covered with battens. The top-strake is elaborately carved.

ocean voyages, that the single canoe, without any outrigger, became the common Maori form of vessel. In this new form of vessel, one of wider beam than the Polynesian outrigger, the Maori performed his coasting voyages round the shores of these islands, where the seas are by no means remarkable for smoothness. As an illustration of the proportions of these vessels, we may give those of a fine specimen named Te Toki-a-tapiri, now in the Auckland Museum (Fig. 2). The length of this vessel is eighty-three feet, and beam seven feet. It seems probable that many of the vessels in which the ancestors of the Maori reached New Zealand were not so long as the above.

SAILS AND RIGGING

The Polynesian voyager employed both sails and paddles, some vessels being provided with two masts. The common form of sail was a lofty triangular one, set with the narrow end downward, as seen in the plates of the works of early European explorers in these seas. The lateen sail was used on the big double canoes of Tonga and some other western groups; there is also some evidence to show that it was formerly employed in New Zealand,

under the name of *ra kaupaparu*. The upright form, *ra kautu*, was also used there, and was, apparently, the only form seen by early settlers.

The single canoe of Polynesia is a quick sailer and less cumbrous than the double canoe; it seems to have been more favored by voyagers in some cases, though the Tongans made their remarkable voyages to Melanesia in a big type of double canoe traceable to a Fijian origin. The Fijians, a Melanesian folk, constructed fine vessels, but made no voyages outside their own groups, save as companions of Polynesian voyagers.

Our Polynesian navigator is said to have made his deep-sea voyages in open canoes, but there is clear reference in Maori tradition to the covering of vessels at sea on the approach of bad weather. This covering consisted of a sort of awning called a *mahau*, the frame of which was rapidly erected when necessary. Upright stanchions were lashed to the thwarts on both sides of the hull; curved transverse rods, lashed to each brace of uprights, supported longitudinal battens; and over all were drawn mats, which were stretched taut and lashed down at the sides.

Cook remarks that some of the New Zealand canoes would carry sixty, eighty, or one hundred people. Cruise saw a fleet of fifty of these in 1820, many of which were seventy to eighty feet long, and few less than sixty. He also mentions one eighty-four feet long, six feet wide, and five feet deep, made from a single log. With ninety paddlers and three fuglemen she moved with astonishing rapidity, causing the water to foam on either side.

Many Tongan double canoes were one hundred feet long and carried a huge lateen sail, while the deck supported a house or cabin. The *pahi*, a big double canoe, was much used for ocean navigation in the Cook, Society, and Paumotu groups. Cook saw a fleet of one hundred and sixty large double canoes at Tahiti, besides one hundred and seventy smaller ones. At Samoa the larger hull of a double canoe was sometimes considerably over a hundred feet in length. Polynesian canoes and their construction comprise a subject of much interest, albeit we have no space to discuss them further.

The Peopling of the Many-Isled Sea

Audacious Voyagers

Let us now consider briefly the feats of Polynesian navigators, of the sturdy Neolithic sea rovers, who, as they quaintly put it, broke through the hanging sky, and explored the vast area of the Pacific Ocean, who rode boldly out on the far-reaching *ara moana*, or sea roads, in quest of new lands, who crosshatched the heaving breast of Hine-moana[1] with the wake of their lean prau. Long centuries before Columbus and his timid crews crept fearfully across the Western Ocean, the Polynesian was making voyages of thousands of miles in rude open vessels on seas unknown to Europeans. He did not waste time and weaken his resolution by fearing unseen dangers, or by whining to his gods to keep him from falling over the

[1] Personified form of the ocean in Maori myth.

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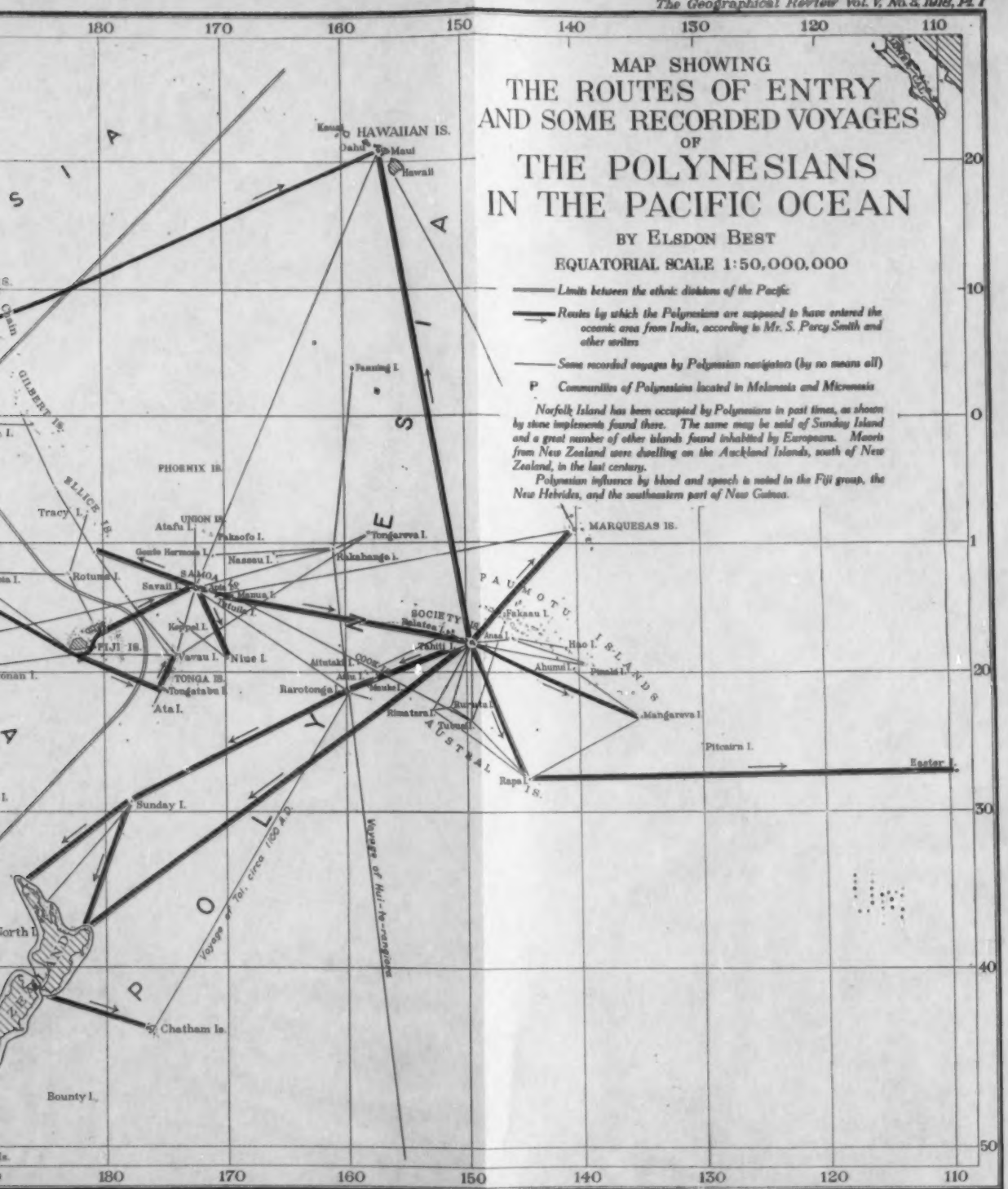
MICRONESIA
MARSHALL IS.
Ratlick Chain
Roderick Chain
CAROLINE ISLANDS
Ulea I.
Nukuoro I.
GILBERT
Ocean I.
MALAY PENIN.
SUMATRA
BORNEO
CELEBES
NEW GUINEA
MELANESIA
Ontong Java
SOLOMON ISLANDS
Stewart I.
Rennell I.
Tikopia I.
NEW HEBRIDES
Erroman I.
LOYALTY Is.
NEW CALEDONIA
AUSTRALIA
Norfolk I.
North I.
South I.
NEW ZEALAND
TASMANIA
Auckland Is.


MAP SHOWING
THE ROUTES OF ENTRY
AND SOME RECORDED VOYAGES
OF
THE POLYNESIANS
IN THE PACIFIC OCEAN
BY ELSDON BEST
EQUATORIAL SCALE 1:50,000,000
Limits between the ethnic divisions of the Pacific
Routes by which the Polynesians are supposed to have entered the oceanic area from India, according to Mr. S. Percy Smith and other writers
Some recorded voyages by Polynesian navigators (by no means all)
P Communities of Polynesians located in Melanesia and Micronesia
Norfolk Island has been occupied by Polynesians in past times, as shown by stone implements found there. The same may be said of Sunday Island and a great number of other islands found inhabited by Europeans. Moorls from New Zealand were dwelling on the Auckland Islands, south of New Zealand, in the last century.
Polynesian influence by blood and speech is noted in the Fiji group, the New Hebrides, and the southeastern part of New Guinea.
HAWAIIAN IS.
Oahu
Maui
Hawaii
Fanning I.
GILBERT IS.
PHOENIX IS.
ELLICE IS.
Tracy I.
UNION IS.
Atafu I.
Fakaofo I.
Tongareva I.
MARQUESAS IS.
Gente Hermoso I.
Nassau I.
Nukuhanga I.
Rotuma I.
SAMOA
Savaii I.
Upolu I.
Manua I.
Tutuila I.
Keppel I.
SOCIETY IS.
Raiatea I.
Tahiti I.
Fakaau I.
Anaa I.
Hao I.
PAUMOTU ISLANDS
FIJI IS.
Vavau I.
Niue I.
Ahunui I.
Pinaki I.
TONGA IS.
Tongatabu I.
Ata I.
Rarotonga I.
Mauke I.
Rimatara I.
Rurutu I.
Tubuai I.
Mangareva I.
AUSTRAL IS.
Rapa I.
Pitcairn I.
Easter I.
Sunday I.
Chatham Is.
Bounty I.
Voyage of Toi, circa 1350 A.D.
Voyage of Hui-te-rangiora
POLYNESIA
MELANESIA
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edge of the world, for he firmly believed his gods to be on his side and ever upholding him. Gripping his long steering oar and trimming his lofty sails, he threw the racing leagues astern and boldly sailed down into unknown seas in search of adventure or a new home. Ignorant of the compass and of charts, he held his prow on the heavenly bodies or followed the regular roll of the waves before the trade winds. From the far-flung Carolines to the lone outpost of Easter Island, from Hawaii in the north to New Zealand in the south, across seven thousand miles of the ocean the Polynesian lifted the rolling water trails of the Pacific. Ever yielding to the lure of Hine-moana, urged on by the spirit of adventure, he drove his long boat across many lines of longitude through many degrees of the thermal line.

The peopling of the eastern Pacific by the Polynesians has been brought about in two ways, namely, by voyages duly planned and by drift voyages. We have much evidence to show that, in former times, the Polynesians made many voyages of exploration, during which many islands were settled and resettled by them. We have also knowledge of a great many cases of drift voyages in many directions, and tradition tells us that the first peopling of New Zealand was due to such a voyage. Drift voyages were generally due to the winds, sometimes to fog, while ocean currents have also played their part.

Cook tells us that he found the Polynesians occupying an area measuring twelve hundred leagues from north to south and sixteen hundred leagues east and west, but outside those bounds exist certain Polynesian communities in Melanesia and Micronesia. Some of the set voyages made within this area, as also others that extended outside of it, will now be considered.

Voyages to New Zealand

When we think of the number of long voyages made by Polynesians with but a small area of land as an objective point, we must acknowledge them to be bold and skillful navigators. Such voyages as those from Hawaii to Tahiti and from Tahiti to New Zealand called for the navigation of long distances broken by few or no havens of rest, when a considerable supply of stores would have to be carried and great care displayed in keeping the course. In the voyage from Tahiti to New Zealand, of which many have been made, the navigators ran down to Rarotonga in the Cook group and from there launched out on the run of about 1,600 miles to New Zealand. This voyage was made in December, when the wind was favorable; the return voyage being made in June. This long run would probably occupy about a fortnight, but might have been done in less time with a steady wind. On this voyage vessels sometimes called at Sunday Island, which is 600 miles from New Zealand; but so small an island must, one would imagine, have been often missed. Two explorers named Kupe and Ngahue, from the Society group, are said to have discovered New Zealand, which was then

uninhabited. Thirty generations ago another Polynesian voyager, named Toi, reached these isles and found much of the North Island occupied by a dark-skinned folk of a culture inferior to that of the Polynesians, perhaps a mixed Polynesian-Melanesian breed. These were the descendants of the crews of three canoes that had been driven from their home land by a westerly storm to be cast on these shores. An interesting feature in the voyage of Toi is the fact that, in sailing southwest from Rarotonga, he kept too far east and missed the North Island, but discovered the Chatham Islands, then uninhabited. By ranging westward he reached New Zealand, and a number of return voyages from here are also recorded in tradition. A Polynesian voyager named Nuku brought a party of adventurers to these isles about twenty-eight generations ago in two double canoes and one outrigger vessel. In order to expedite his return to Polynesia he dismantled his double canoes and transformed them into outrigger vessels. The last recorded voyages from New Zealand to Polynesia occurred ten generations ago.

Marquesans and Hawaiians

Porter, an American voyager, collected some interesting notes early in the last century of voyages made by natives of the Marquesas group. He tells how the grandfather of a reigning chief sailed, with several families, in four large canoes in search of other lands, taking with him hogs, poultry, and young food plants. In this manner have the breadfruit, coconut, banana, yam, sweet potato, taro, etc., been distributed over the oceanic area. Most of these food-producing trees and plants are traceable to a western source, as also the *aute*, or paper mulberry, but the sweet potato and coconut are thought by some to have originated in America.

Fornander tells us that, in former times, the Marquesans voyaged to the Hawaiian group and made many voyages westward from their own isles, some of them in search of a traditional fatherland supposed to lie in that direction.

Fornander and Ellis both tell of voyages made by the Hawaiians to the Marquesas and Society groups, one Hawaiian navigator making no less than four voyages to Tahiti, some 2,800 miles distant. Hawaiian traditions describe how these seafarers steered by the stars, how an old-time voyager reached a far land peopled by a slant-eyed folk and brought two white men back with him. Marquesans told Quiros of far-distant lands inhabited by black folk who fought with the bow and arrow, an implement never used in war by Polynesians.

Samoans

The Samoan voyagers of yore seem to have ranged far and wide across the Pacific, and oral traditions tell us of their voyages to the Hawaiian, Marquesas, Society, Cook, Tonga, Paumotu, and Fiji groups, also to many isolated isles. As an illustration of such voyages of adventure and exploration we particularize one made by Uenga, a Samoan navigator of the twelfth

century, omitting two stages of the voyage not clearly explained. Uenga sailed from Savaii to Tonga (480 miles south-southeast) and thence to Vavau (150 miles north-northeast). From here he was swept by a storm to some unnamed island, whence he sailed to Tongareva (900 miles northeast of Savaii), from which place he went to Rimatara (780 miles south-southeast), thence to Rurutu (70 miles east-northeast), thence to Tubuai (120 miles southeast), and thence to Fakaau in the Paumotus (480 miles north-northeast). After voyaging through this far-spread archipelago he went to Tahiti, from which place he worked his way homeward to the Samoan group.

Some of the early Samoan settlers came from Atafu in the Union group, and Rarotonga was settled in early times by Samoans. When Toi sailed from the Society group, he went to Pangopango on Tutuila (Samoan Islands), thence to Rarotonga, thence to New Zealand. Maru and Te Arutanga-nuku, two other famed explorers, made many voyages. Tangihia reached Niue, Keppel Island, the Marquesas, Tahiti, Mauke, Rapa, Rurutu, Rimatara, and other islands. Whiro was another famed sea stroller who reached many lands, as also did Tutapu. Rarotongan traditions tell us of the amazing voyage of one Hui-te-rangiora, who sailed southward until he encountered icebergs and frozen seas, described as resembling a vast extent of *pia* (prepared arrowroot).

The traditions of Rarotonga also tell us of a fleet of thirteen vessels that reached that island from the far eastern isles of Polynesia some twenty generations ago. Five of these vessels remained at Rarotonga, their crews settling there, while the other eight sailed in search of other lands. The names of all these vessels have been preserved at Rarotonga. From Maori traditions of New Zealand we know that six of them reached its shores, but the other two have not been traced. Curiously enough the natives of the Cook group state that they are partially descended from immigrants from New Zealand.

Tongans

Of Tongan navigators much might be written, for these folk seem to have continued making long voyages down to the time of European intrusion. Sterndale, a close observer, tells us that, had the Tongans possessed metal tools, they would have subdued all Polynesia:—"Their immense war canoes, at least a hundred feet long, rigged with a lateen yard, were miracles of patient ingenuity, and needed indomitable daring for their navigation." The Tongan invasion of Fiji is a well-known fact, but the advent of Europeans stayed their rapidly increasing power in that group. Tongan raiders made voyages westward to the New Hebrides and Loyalty Islands, to Tikopia and New Caledonia. Labillardière speaks of seeing one of their vessels off the coast of the latter island.

Drift Voyages

The effects of involuntary drift voyages are often far-reaching. We

have seen that drift canoes gave New Zealand its first inhabitants. It was a drift voyage that brought Toi and his companions thither, for they were in search of one Whatonga and others who had been driven from their home island by a storm. There are two traditions of drift vessels from New Zealand reaching Polynesia in later times. Cook found castaways from Tahiti on Atiu Island, of the Cook group. In 1721 two canoes reached Guam after a drift voyage of twenty days. In 1817 Kotzebue found at an island of the Radack Chain a native of Ulea, of the Caroline group, from which place, with three companions, he had made a drift voyage of 1,500 miles. Again, Kotzebue encountered a Japanese vessel off the California coast in 1815 that had drifted for seventeen months across the North Pacific. The Japan Current has carried a number of such vessels to the coast of British Columbia, and one such was wrecked at the Hawaiian Islands.

In 1844 a whaleboat drifted from Anaa Island, east of Tahiti, to the Samoan group in forty days. Of the crew, three natives and a white man, only the latter survived. In 1862 sixty natives drifted from Fakaofo to Samoa, 300 miles. The missionary Williams drifted 1,200 miles from Rarotonga to Tongatapu through the influence of the trade winds; this in his "home-made" boat. On another occasion he drifted from Tahiti to Aitutaki, in the Cook group. One of his boats, running from Tahiti to Raiatea, was blown out of its course and, after a six weeks' drift, reached Atiu. Dillon tells of a drift canoe from Rotuma reaching Tikopia, about 465 miles, a minor drift.

In 1832 Williams found at Manua, in the Samoan group, a native of Tubuai, far south of the Society Islands. His party had been three months drifting from one isle to the other. Some natives of Aitutaki drifted to Proby's Island, 1,000 miles to the westward. In many of these cases of drift voyages rain water and fish were the salvation of the ocean waifs, in many others dreadful hardships were endured, and no doubt many such parties have perished to a man. Strong winds and a cloudy sky have been the cause of many weary drift voyages, but the worst combination was a fog and a change of wind; this left the hapless voyager utterly helpless.

The missionary Threkeld reported that, on March 8, 1821, a canoe from Rurutu, of the Austral group, reached Raiatea after a three weeks' drift and dire suffering among its crew. Pritchard mentions a community in the Loyalty group who are descendants of castaways from Tonga, over 1,100 miles away.

The Lesson of these Voyages

Many similar cases of drift voyages are known in tradition, and many have been vouched for by reliable Europeans. The lesson we may learn from all these voyages of exploration and adventure, of forced migrations of defeated tribes, of drift voyages, is the manner in which the isles of the Pacific were settled by man. Quiros, one of the earliest European voyagers in the Pacific, held that a great motherland must exist in the south, "as

otherwise the islands could not have been populated without a miracle." Other writers, down to the present time, have proved to their own satisfaction that the Polynesians could not possibly have made such voyages as we have mentioned above, that they could not have reached New Zealand from Tahiti in "frail canoes" by their crude methods of navigation. In this case the fact that the Maori language is spoken from New Zealand northward to Hawaii, from Easter Island westward to the Tongan group, as also in isolated places in Melanesia and the far-away Carolines, must be the miracle mentioned by Quiros. As to frail vessels, the top-straked dugout, outrigger or double, was a stronger craft than the ship's boat in which Bligh and his companions made their amazing 4,000-mile voyage from Tonga to Timor in forty-one days.

The True Argonauts

A glance at the accompanying map (Pl. I) shows us that our Polynesian navigators have crosshatched the eastern Pacific with their voyagings, while their influence, blood, and speech are noted as far west as the Solomon Islands and New Guinea. To such a bold race of seafarers what difficulties would be presented by a voyage through the close-lying isles of Indonesia? Of a verity, could we but write the history of our Polynesian navigators, our Maori buccaneers, it would be a wonder story for all time, and coast-creeping Argonauts of yore would lose caste. For the true Argonauts are here, here in the sunlit isles of Polynesia. But we cannot grasp these facts, and, moreover, we do not like them. Because we crept alongshore for long centuries, and feared to lose sight of land, we object to the idea that the Polynesian made long ocean voyages in pre-compass days. Our Polynesian voyager stoutly maintains that he sailed his prau across the rolling realm of Hine-moana whenever he felt like it, but our wise men say that he did no such a thing, that a miracle occurred, or that the earth sank under him, leaving him clinging desperately to the mountain peaks we call the isles of Polynesia. "There is," quoth the late Mr. Billings, "a deal of human natur' in man."

Ask one of my Maori friends how his ancestors managed to reach New Zealand from eastern Polynesia in their Neolithic dugouts, lacking scientific instruments. He will, with serious mien, tell you that the gods assisted them, guided them across the great ocean, watched over them as they rode out the ocean gale to the stone sea anchor, protected them from all dangers of the deep. He will recite to you the sacred ritual by which the aid of the gods was invoked and explain wondrous talismans that were the salvation of the life principle, physical and spiritual. He will tell you how Kahukura, the rainbow god, acted as pilot; how Hine-korako (lunar halo personified) guided them; how Ruamano, the sea monster, led the way.

But, sayeth the intelligent reader—and all our readers are intelligent—this is nonsense, this is primitive superstition, these gods and demons are

mythical and exist only in the imagination of savages. Friend! all gods exist, all gods are true, all gods are helpful, for just so long as they are believed in. The Polynesian ranged the Pacific Ocean because he believed that his gods were upholding him in all such ventures. As for us, we looked askance at the ocean and peopled distant lands with dread demons, holding it as impious to quit the beaten path. Our gods were not with us. All along the life story of man, throughout the changing ages and round the rolling earth, superstition has been, and is, a mighty power. But it works in different ways.

The day of the Polynesian voyager has passed, and nevermore will the sea roads know him. Never again will he watch the foaming water walls on either side of his flying prau, never again hold her figurehead to a gleaming planet, or listen on darkling waters for the long-drawn thunder of the ocean surge on the guardian reef.

But, in days that lie before, men will tell how the brown-skinned sea rovers sailed to and fro athwart the vast Pacific, how they traced out the sea roads with the courage of gods and the ignorance of the Neolith; and how the men of later times followed those rolling waterways. For, as the sea singer has writ—

> Though no man marked a passage,
> Though no man blazed the trees,
> That other feet might follow
> His footsteps on the seas,
> Though no man lit the camp fire,
> Or carried staff and chain,
> The pathways of the waters
> Were ever placed and plain.

Even then will it be recognized that these old Pacific vikings were the true Argonauts and sea-conquerors of old, the men who sought and knew the ways of many waters, the splendid water roads.

> For, circled by the sunrise,
> And spread beyond his set,
> The breezy roads and bonny
> Are rolling bravely yet!
> Beneath the grand expanses
> Of guiding, starlit sky
> The tracks the rovers traveled
> Still wide, unbounded, lie.
>
> And till old Gabriel's trumpet
> Shall echo overhead,
> And from their place of biding
> Come up the wakened dead,
> Till lost ships all deliver
> Their long-forgotten loads,
> Still will they shine and sparkle
> The splendid water roads!

NOTES ON MACMILLAN'S ELLESMERE ISLAND TRIP

Prior to the return of the Crocker Land Expedition last fall, Donald B. MacMillan, the leader, made an exploratory trip along the southeastern coast of Ellesmere Island, the large island of the American Arctic Archipelago bordering on the west the channel between it and Greenland which leads into the Polar Sea. This trip has already been described in the October, 1917, *Review* (Vol. 4, pp. 320-321). Additional details have been furnished the Society by Mr. MacMillan, which, together with photographs taken on the trip, are presented herewith.

Leaving Etah on the Greenland coast on March 27, 1917, MacMillan with three Eskimos crossed Smith Sound in a northwestern direction and then followed the coast of Ellesmere Island south until blocked by open water and an impassable ice-foot at Cape Isabella (in the same latitude as Etah).[1] This was one of the points where cairns were erected by the British Arctic Expedition of 1875-76 under command of Captain (later Sir) George S. Nares. On the outward trip, on July 29, 1875, a cairn was built here and a cask left to receive letters for the expedition.[2] Contact with the outer world was established through Captain (later Sir) Allen Young's voyages in the *Pandora* (later De Long's *Jeannette*).[3] On his attempted trip to the north magnetic pole in 1875 he made two visits to the Cary Islands (in the approach to Smith Sound), leaving mail for the expedition on August 18 and finding despatches from it on September 10.[4] On his second trip, in 1876 (on August 6), he landed at Cape Isabella. The circumstances connected with the depositing of despatches for the Nares expedition are here set forth editorially in order to allow the reader to assign to a find which MacMillan made at Cape Isabella its proper place among the intricacies of these Arctic *malentendus*.

On August 3, three days before, Captain Young had visited Littleton Island, on the opposite side of Smith Sound, and found a record signed by Nares and dated July 28, 1875, in which the following passages occurred:[5]

> Should this cairn not be visited by a sledge party from the expedition before June,

[1] For location of places see the map in the Geographical Record under "Polar Regions," below.

[2] See G. S. Nares: Narrative of a Voyage to the Polar Sea during 1875-6 in H. M. Ships 'Alert' and 'Discovery,' 2 vols., London, 4th edit., 1878; reference in Vol. 1, pp. 56-57. The passage reads: "Commander Markham accompanied by Captain Feilden landed in a small bay on the south side of the extreme point of the cape. After an extremely rough scramble up one of the gullies, a cairn was erected on the outer spur of Cape Isabella, 700 feet above the water-line; a cask for letters and a few cases of preserved meat being hidden away on a lower point, about 300 feet high, magnetic west of the cairn."

Cf. also: Journal and Proceedings of the Arctic Expedition, 1875-6, under the Command of Captain Sir George S. Nares, R.N., K.C.B., *British Parliamentary Paper C 1636*, London, 1877, p. 4.

[3] Allen Young: The Two Voyages of the 'Pandora' in 1875-76, London, 1879. The relevant passages are on pp. 32-33, 70-71, 83-84, 125-126, and 132-150. In the following account *Parliamentary Paper C 1636* is followed.

[4] Young, *op. cit.*, pp. 32-33 and 70-71 and *Parliamentary Paper C 1636*, p. 470.

[5] *Parliamentary Paper C 1636*, p. 478.

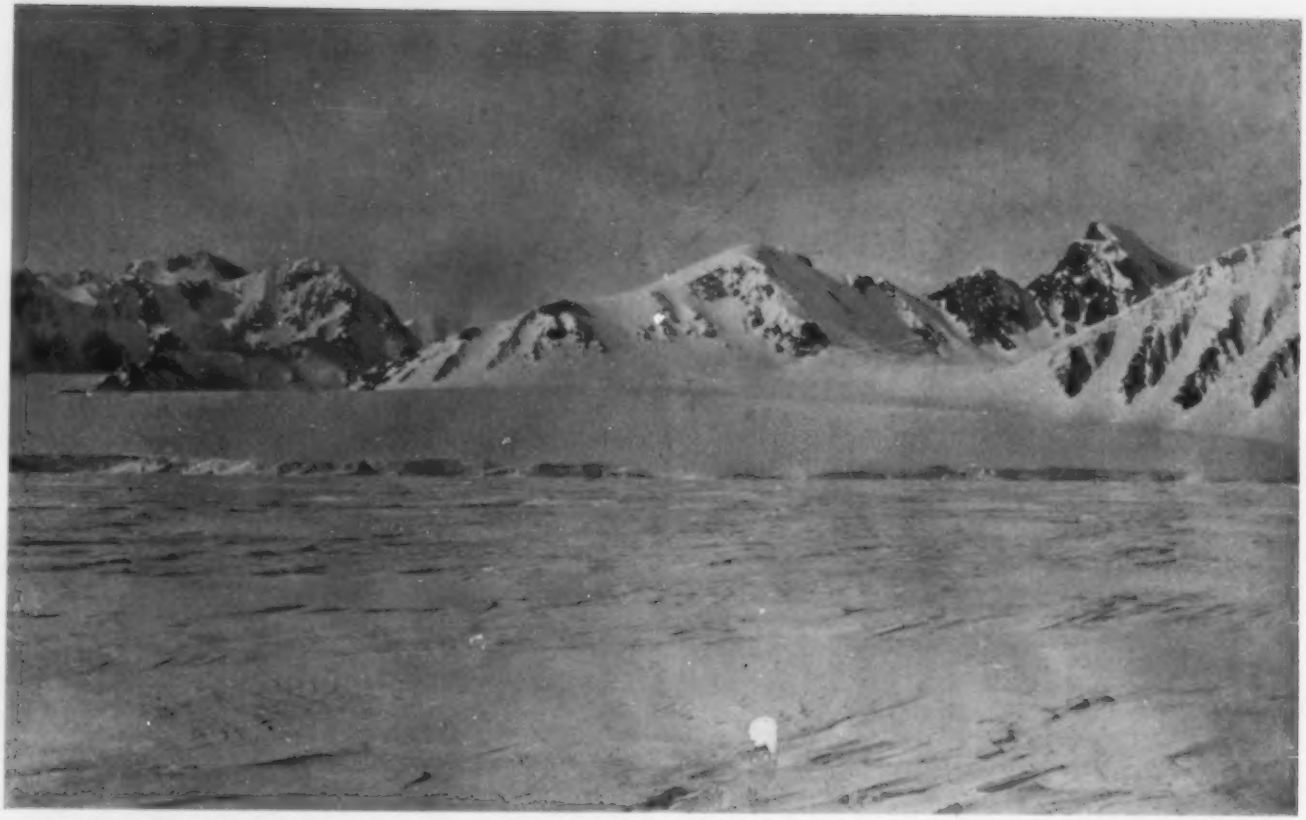

FIG. 1—The American Geographical Society Glacier near Boger Point (77° 25′ N.) on the Ellesmere Island coast; so named by Mr. D. B. MacMillan, leader of the Crocker Land Expedition. It is typical of the piedmont glaciers through which the ice cap covering this part of the island discharges to the sea.

FIG. 2—Approaching from the south a depression on the landward side of Cape Isabella.

FIG. 3.

FIG. 4.

FIG. 3—Camp on the sea ice about twenty-five miles south of Cape Isabella. The coast is visible in the distance.

FIG. 4—Camp at Cape Isabella.

FIG. 5.

FIG. 6.

FIG. 5—Brevoort Island from Peary's hut at Cape Sabine.
FIG. 6—Ice-foot near Cape Sabine.

1876, our despatches will be found near a cairn on Cape Isabella; but if the strait is easily crossed, the sledge will visit this position.

Should any letters for us be brought thus far I request that they may be brought on as far north as the vessel intends to come on the west side of the strait. If the vessel is not to enter the strait, then I request that our letters may be placed in my cairn on Cape Isabella. . . .

My intended stations on the west shore of the strait, where cairns may be expected to be found, and which will be regularly visited as long as the expedition remains north of Smith Sound, are Cape Isabella, Island off Cape Sabine, Dobbin Bay, or Cape Leidy, Carl Ritter Bay, and Cape Bellot.

In view of the ice-filled condition of Smith Sound and the relatively early date, Captain Young could not tell what his movements in the immediate future would be or even whether he could again visit the cape. He therefore decided to land only the loose letters and to hold the sealed bags containing the important official despatches until the landing party returned with further information.[6] The landing party, under Lieutenant Charles R. Arbuthnot, found a message from Captain Nares twenty feet magnetic north of a cairn on top of the cape and reported that, at an unconventional distance from a smaller cairn on a lower point, four cases and a cask were found, which they did not open, however, believing the cases to contain provisions and assuming that a cask in so obscure a position would not contain letters.[7] The message from Captain Nares read:[8]

H. M. S. "Alert," at Cape Isabella,
29th July, 1875.

"Alert" and "Discovery" erected this cairn 29th July, 1875. Should the Strait be impassable for a sledge, the despatches from the expedition will be deposited in a cask on the lower point magnetic west of this position each spring of our stay north of Smith Sound.

Anyone having despatches or letters for the expedition, is requested to deposit them in the cask, unless he is coming farther north, in that case a cairn will probably be found at Cape Sabine, Dobbin Bay, Carl Ritter Bay, and Port Bellot. All well on board. No ice in sight.

Should the strait be passable, the despatches will be taken to Littleton Island.

G. S. NARES,
Commanding Expedition.

The wind having increased considerably in violence, it was not possible to return. As the wording of Captain Nares's message made it seem certain, however, that the cask on the lower point was the one referred to that would contain the expedition's despatches, Captain Young resolved to revisit the cape. After an unsuccessful attempt on August 7 and more than two weeks' cruising in the neighborhood watching for favorable ice conditions, Cape Isabella was finally reached on August 25. On examination the cases were found to contain preserved meat and the cask was empty. This showed that no sledge party from the Nares expedition had reached this point.

[6] *Parliamentary Paper C 1636*, p. 471. [7] *Ibid.*, p. 476. [8] *Ibid.*, p. 477.

FIG. 7.

FIG. 8.

FIG. 7—Foulke Fiord (Etah) on the Greenland side of Smith Sound, with the headquarters of the Crocker Land Expedition on the foreshore in the foreground.

FIG. 8—"Borup Lodge," the headquarters of the Crocker Land Expedition at Etah. In the foreground, dog teams preparing to leave.

On both visits to Cape Isabella Captain Young left records of his movements. On the second visit the record stated that the sealed bags containing the despatches had been left at Littleton Island two days before, on August 23—a step decided on because at that time it did not seem probable that Cape Isabella could be reached. These records were buried twenty feet magnetic north of the small cairn on the lower hill.

FIG. 9—E-took-a-shoo, one of MacMillan's Eskimo companions on his Ellesmere Island trip, who discovered Sir Allen Young's record at Cape Isabella (see the text and Fig. 11). E-took-a-shoo was one of two Eskimos, companions of Dr. Frederick A. Cook on his Arctic journey of 1907-09, who testified to MacMillan that Cook did not reach the pole (see the February *Review*, pp. 140-141).

A fortnight after Captain Young's departure the ships of the Nares expedition, the *Alert* and the *Discovery*, stopped at Cape Isabella, on September 9, homeward bound. The landing party, under Commander Albert H. Markham, found the package of letters but failed to find Captain Young's record. Because of this Captain Nares did not know of the fact that the main despatches had been left at Littleton Island, and the expedition returned to England without calling there.[9]

It was Captain Young's records and a record left by Captain Nares

[9] G. S. Nares's work cited in footnote 2, p. 174.

FIG. 10.

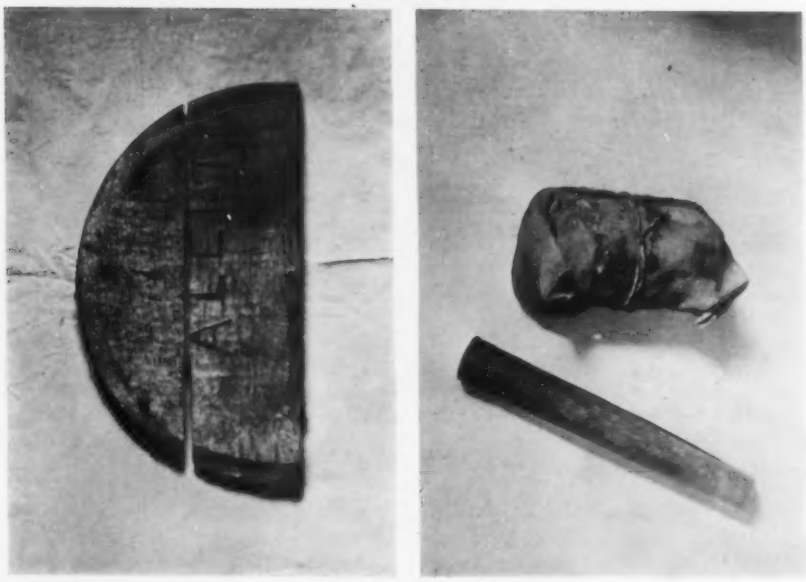

FIG. 11.

FIG. 10—Cairn erected on Cape Isabella by the British Arctic Expedition of 1875-76 under command of Captain (later Sir) George Nares.

FIG. 11—(Left) Head of a cask marked "Alert," found by MacMillan in 1917 at Cape Isabella, which contained records from the British Arctic Expedition of 1875-76.

(Right) Upper—Tin wrapped in sailcloth containing despatches from Sir Allen Young of the *Pandora* expedition of 1876, found at Cape Isabella on MacMillan's trip of 1917. Lower—Copper tube containing Captain Nares's records which was inside the cask marked "Alert."

on September 9 that MacMillan had the good fortune to find. The main cairn (Fig. 10) on top of the cape was first examined, MacMillan reports, but it contained nothing. On descending to the lower point a cask was finally discovered with its head marked "Alert" (Fig. 11). Within was a copper tube containing the record written by Captain

FIG. 12—Sun dropping into the sea at Etah.

Nares, consisting of a summary of the work of the expedition. This, according to the copy furnished to the Society by Mr. MacMillan, reads:

Arctic Expedition 9th September, 1876

H. M. S. "Alert" at Cape Isabella

Her Majesty's ships "Alert" and "Discovery" arrived here on their way south to Port Foulke. The "Alert" wintered in Lat. 82° 27′ N., Long. 61° 22′ W., inside grounded ice. The "Discovery" wintered in a sheltered harbour in Lat. 81° 44′ N., Long. 65° 3′ W.

The sledge crews of the "Alert," after a severe journey over the ice, succeeded in attaining Lat. 83° 20′ 30″ N., and the coast line from the Winter Quarters of the "Alert" to the northward and westward was explored to Lat. 82° 23′ N., Long. 84° 26′ W., Cape Columbia, the northernmost cape, being in Lat. 83° 7′, Long. 70° 30′ W.

Sledge parties from the "Discovery" explored the north coast of Greenland to Lat. 82° 21′ N., Long. 52° W. (approximately), a distance of seventy miles beyond "Repulse Harbour."

No land was sighted to the northward of the above explorations except a few small islands at the extreme of the Greenland coast explored.

Lady Franklin Sound was explored by the "Discovery" and was found to run S.W. 65 miles, and terminated in two small bays, also Petermann's Fiord for 19 miles, and was then found to be impassable for sledges owing to glacier ice.

A seam of coal 250 yards long and 22 feet thick was found in the neighbourhood of the "Discovery's" Winter Quarters.

[Passage illegible] employed in sledge travelling.

H. M. S. "Alert" — Four deaths have occurred,—Neil C. Petersen, Interpreter, at Winter Quarters on the 14th May, from the effects of a severe frost bite (which necessitated a part of each foot being amputated) followed by exhaustion and scorbutic taint. George Porter, Gunner, R.M.A., on the 8th June of scurvy and general debility, when absent on a sledge journey, and was buried in the floe in Lat. 82° 41′ N.

H. M. S. "Discovery" — James J. Hand, A. B., of scurvy on the 13th of June and Charles W. Paul, A. B., of scurvy on the 29th June; both buried in Polaris Bay.

The ice in the Polar Sea broke up on the 20th day of July, and on the 31st the "Alert" left her Winter Quarters, and on the 12th of August joined the "Discovery." Both ships left "Discovery Bay" on the 20th day of August and proceeded south.

All well.

We are homeward bound with very little ice in sight. We shall call at Disco, but not at Littleton Island or Port Foulke.

G. S. NARES, *Captain R.N.*
Commanding Arctic Expedition.

Captain Young's records, together with a letter from Lieutenant Arbuthnot to Captain Stephenson of the *Discovery*, were found by E-took-a-shoo, one of MacMillan's Eskimo companions, in a tin wrapped in heavy sailcloth (Fig. 11). The record left by Captain Young on his second visit, as supplied by Mr. MacMillan, reads:

"Pandora," August 24th, midnight, 1876

Dear Captain Nares:

On our previous visit here—Aug. 6th, 1876—we were blown off by a gale and drift ice, and have ever since that date been attempting to regain the cape, a solid pack of drift ice extending from Cape Dunsterville on the west shore round to Cairn Point on the east shore preventing our reaching within 10 miles of Cape Isabella.

I have tried to get northward but have not been able to reach beyond Cape Paterson on this side, or Latitude 78° 45′ on the east side.

On August 6th our landing party were unable to examine the packages, and we were thus left in doubt as to whether they were your despatches or some of your provisions, and hence my attempts to regain the cape.

Failing in our repeated attempts to regain the cape, and seeing no prospect of our doing so this season, I landed the bulk of your letters and despatches on the lower point N.N.E. (mag.) from your cairn on Littleton Island and where I hope they will be even more accessible to you than on this cape.

After a heavy southerly gale yesterday, we have succeeded in getting through the S.W. pack, and if I succeed in getting back into clear water, I proceed homewards at the end of this month, having cruised here all the navigable season in the event of your sending a boat party to Littleton Island.

Trusting that you are all well and have succeeded in your arduous work,

Yours truly,

ALLEN YOUNG.

Landed at 1 A. M. August 25 and on examination found the cask to be empty and the cans to contain preserved meat. They will be left as they were found.

It is evident no sledge party has visited this place.

CHARLES R. ARBUTHNOT

Returning from Cape Isabella, MacMillan reached Etah on April 9. Starting again on May 3, MacMillan followed his previous route but this

time succeeded in advancing farther south along the Ellesmere Island coast. Instead of reaching Clarence Head (76° 40′ N.) as reported in the October, 1917, *Review*, it appears that the farthest point attained was Boger Point (77° 25′), from which, however, sights were taken toward the south. This disclosed the fact that Sonders Island (77° 10′) is at present a nunatak interrupting the surface of a glacier. This circumstance and the fact that MacMillan counted fifty-five tidewater glaciers between Cape Sabine (78° 50′) and Clarence Head as compared with nine indicated on a standard map based on conditions fifty years ago[10] would seem to show that, even when allowance is made for the provisional nature of the earlier surveys, glacial activity has greatly increased throughout this region during the last half-century. The front of one of these glaciers, the American Museum Glacier, between Paget Point (78° 10′) and Cape Faraday (77° 50′), is almost 20 miles long; a similar glacier somewhat farther south is the American Geographical Society Glacier (Fig. 1).

Starting back from Boger Point on May 16, Etah was reached on May 24 and the trip thereby brought to its close.

[10] Polar Regions: Baffin Bay to Lincoln Sea, 1:1,400,000, U. S. Hydrographic Office Chart No. 2142, which is based for this region mainly on surveys from a ship's deck by Inglefield in 1852 and Hayes in 1861 (for sources see note in October, 1917, *Review*, Vol. 4, p. 321).

MODERN ICELAND

By GODMUNDUR KAMBAN

I have sometimes been surprised to meet Americans with a thorough knowledge of so small a country as Iceland, but I have been equally astonished to find persons who firmly believed that Iceland is an uncivilized country. The fact is this: Three times in four centuries, respectively one-third, one-fifth, and one-ninth of its population have perished by volcanic eruptions, plagues, and famine, and the remainder went through terrific ordeals of all kinds. Yet, in spite of that, Iceland presents itself today as a self-governing nation, with full dominion over all its affairs, having taken into its own hands all means of communication, foreign and domestic, and exporting to almost every country of Europe products which have established themselves through their excellence. It has a thoroughly modern school system, with public schools, commercial and high schools, nautical, technical, and agricultural schools, and a college, almost four hundred years old, one of the oldest in Scandinavia, as well as a university, recently established. It has more than twenty-five newspapers, the oldest in existence over fifty years, and fifteen or more periodicals, one of which was founded over ninety years ago and is the oldest Scandinavian magazine. Finally, it has a rich literature and has produced authors and artists who, in spite of the handicap of coming from so small a nation, have made their names known and honored in other countries. If the Icelandic nation, with its old culture and its modern civilization, is to be classed with barbarians, well, the barbarians are to be congratulated!

I should like to ask my readers to take an imaginary trip to Iceland with me. We see by the map that Iceland extends from 63½° to 66½° N., its extreme northerly point being touched by the Arctic Circle. It is some 200 miles southeast of Greenland, about 600 miles west of Norway, and 500 miles northwest of Scotland, the distances given being those between the nearest points of the respective coasts. The area of Iceland is 40,500 square miles, or about 8,000 square miles greater than that of Ireland. An erroneous opinion prevails, suggested by its deceptive name and by its high latitude also, that Iceland is a very cold country. On the contrary the climate of Iceland is comparatively mild, its western, southern, and eastern coasts being protected from the polar ice by the Gulf Stream. The summer is never very hot, and the winter never very cold, the average winter temperature along the entire coast line being between 31° and 32° F.

We can choose a shorter and easier route to Iceland now than we could three years ago. We need not now go to England and wait there a week or two for a ship to come from Denmark and take us to our destination.

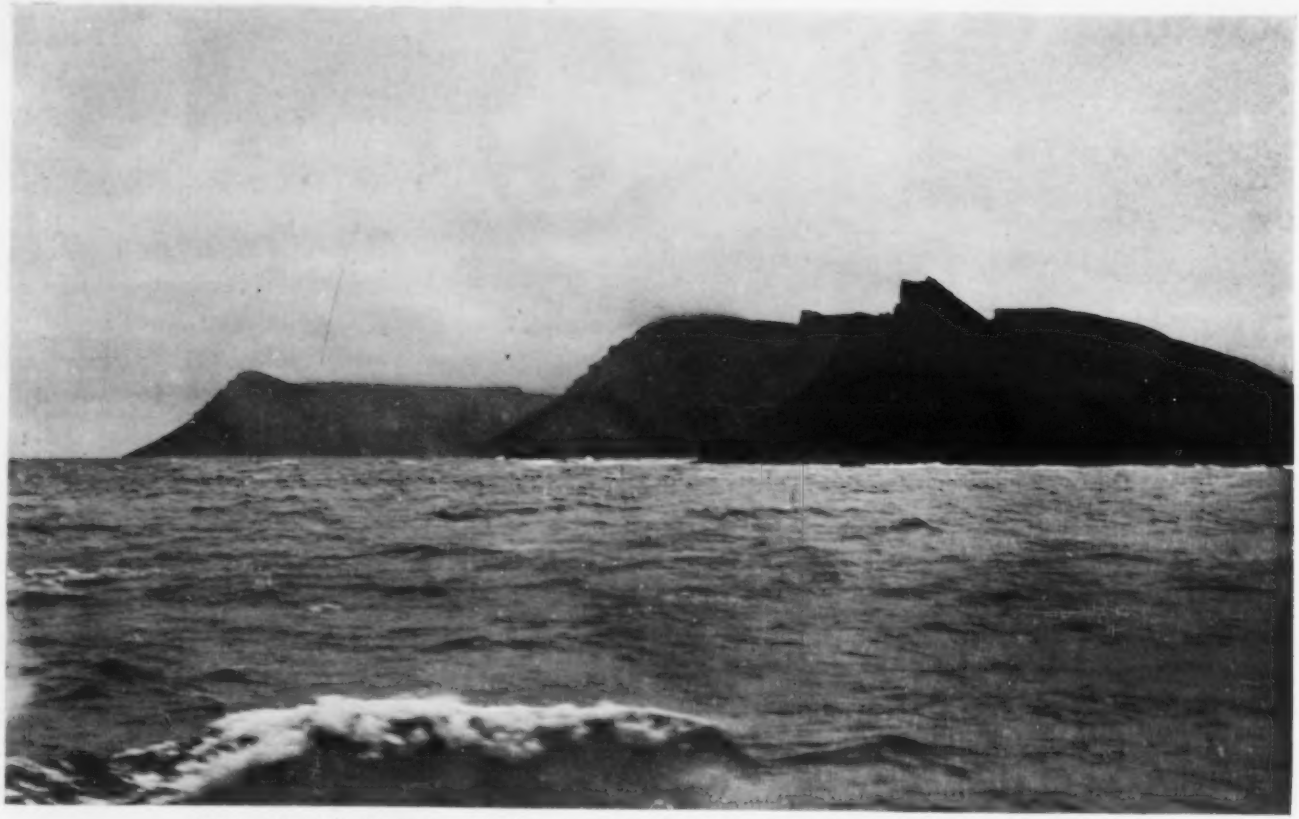

FIG. 1—Iceland's "rock-bound coast": the northwestern corner of the island. (Courtesy of Henry E. Ferguson.)

We can go direct from New York on one of the boats of the Icelandic Steamship Company, either the *Gullfoss* or the *Godafoss*, which make two voyages a year between New York and Reykjavik, the capital of Iceland. While we are on our way to the famous saga land, where practically all the masterpieces of the Scandinavian classics have been written and preserved—works acknowledged by modern scholars not to be inferior to those of Greece—let us first learn how it came about that this isolated and rocky island was ever settled.

Settlement

In the latter part of the ninth century Harold Fairhair gathered all the small states of Norway under his mighty rule. Iceland had just been discovered by Swedish and Norwegian vikings. Rather than submit to Harold's iron rule, which had deprived them of all their allodial possessions and privileges, these noble Norwegian chieftains and sons of chieftains preferred to go to this new island in the Atlantic, bleak and barren though they knew it was. Thus Iceland was not settled by men whom wealth and resources tempted to cross the sea, but by dethroned noblemen, or their descendants, who preferred a home in an uncongenial climate, where no forests gave them building timber, where no fields gave them food, to the loss of freedom. It should be remembered that the aristocratic spirit still lingering in Iceland, the independence that almost approaches defiance, is simply an inheritance from olden times. Georg Brandes, the Danish critic, well appreciated this characteristic and, in a speech delivered on Iceland a few years ago, closed with this toast:

> Long live the glaciers never to be melted!
> Long live the fire never to be extinguished!
> Long live the defiance never to be bent!
> Long live Iceland!

Iceland was settled during the fifty-six years from 874 to 930 A. D., and there has been no immigration since. The population was at the end of that period about 50,000, and it is only 90,000 now. The glorious era of literature, and the romance of life also, which followed after that period, were due to this wonderful birth. For at least four centuries the noble ancestry of the Icelanders was fully acknowledged at all the Scandinavian courts and even in England. All Icelanders of good family were admitted to court in those countries, sometimes took up their residence there for a few years, and were honored with royal gifts. Such was the fashionable method of finishing one's education. The greatness of Iceland's classic literature is not only due to the men who had the time and genius to produce it, but to those also who had the opportunity to share in great scenes and great events.

First Impressions

Since it is in modern Iceland that we are chiefly interested, we now, nine or ten days out of New York, looking out beyond the bow of the ship, can

discern almost a hundred miles away through the blue forget-me-not haze of distance the southernmost glaciers, or *jökler*, rising white and majestic out of the ocean.

Early the next morning we arrive at the Westmen Islands, lying ten miles to the south of Iceland proper and so named after the Irishmen (at that time called Westmen in Scandinavia) who first settled there. They were slaves and belonged to the great number of bondsmen whom the Norwegian chieftains brought with them either from Ireland or Norway.

On one of the precipitous crags of the islands, if we are lucky, we may witness a typical Icelandic mountain scene. Amongst the sheer rocks, which no foot can climb, black gulls, guillemots, puffins, and other sea birds build their nests. The only way to catch these birds is to descend by means of a rope from a projecting ledge above them and to take them with nets. This requires two men, of whom one remains at the brink of the precipice lowering the other, suspended by the rope, down to the nesting places. The work demands great courage and dexterity. Sometimes men go down for other purposes than hunting birds. Angelicas grow there, those beautiful, huge, fan-shaped mountain plants, to be seen in many a garden—and for them many a young man will almost risk his life.

Reykjavik

Next morning, we arrive at the capital, Reykjavik. The name means "smoking creek." When the first settler of Iceland, Ingolf Arnarson, landed at this place in 874 A. D., he observed a bluish-white cloud of vapor hovering over the ground and gave the creek this name. The vapor issued from the hot springs about two miles from the town. There are a great number of such springs in Iceland. A cold brook runs near this spring and the hot water tempers one branch of it into a swimming pool and the other into a general laundry place for the city. Before Ingolf settled, he threw his high-seat pillars into the sea, making a vow that he would build his home at the place where he should find them swept ashore. He found them here; so that he became both the first settler and the founder of the capital.

The inhabitants of Reykjavik number only about 14,000, but it is quite a modern little city, with gas-lit streets, a water-supply system, telephones and telegraphs, a university and all sorts of schools, a public library, and even moving-picture theaters. The new National Library is a fine building with over 80,000 volumes and about 6,000 manuscripts, many of them priceless. The same building houses the archives and ethnographic and natural history collections. There is a church for the free congregation. There is also the State Church, as in nearly all European countries. The religion of Iceland is Lutheran. In the center of the city on a large lawn stands a huge statue of the famous Danish-Icelandic sculptor, Thorvaldsen, given to Iceland at her millennial celebration in 1874. Before we leave we may be fortunate enough to witness one of those sunsets which have given Reykjavik

the name of "The City of Beautiful Sunsets." Some flamelike ball, fashioned of gold and vermilion, seems to have been tossed into the air, and a perfect miracle of colors, to which it is vain to try to give names, is refracted by the mountains and mirrored in the waters.

Historic Scenes

We go next to Thingvellir, "Parliament Field," the historic place where for nine centuries the parliament of Iceland held its meetings. We take an

Fig. 2—The plain of Thingvellir, 25 miles east-northeast of Reykjavik. Thingvellir is a volcanic depression sunk between two great lava fissures, Almannagjá (Fig. 3) and Hrafnagjá. Thingvellir ("Parliament Field") was the meeting-place of the early Icelandic parliament. (Courtesy of the *American-Scandinavian Review*.)

automobile from the city and in less than two hours arrive at the famous Saga retreat. Thingvellir is an extensive plain of grass lying between two lava fields. One of these lava fields is divided by a long deep chasm, the magnificent gorge of Almannagjá, or "Every Man's Rift," so called because the public used to gather there for amusement while the members of parliament were working at the Law Hill. The way to the plain is through a steep portion of this chasm. In the heart of the gulley is the Öxarárfoss, "Axe River Fall." It is the only waterfall in Iceland that might be called artificial. Originally the river flowed quietly along the top of the rocky wall without breaking through; but when this place had been selected as the home of parliament in 930 A. D., the founders took their axes and hewed a bed for the river over the edge, to make the view the more picturesque;

hence the name: "Axe River." The stream runs through a part of the gorge and, crossing Thingvellir, enters the largest lake of Iceland, Thingvallavatn, or "Lake of the Parliament Field," which covers about forty square miles. In this volcanic region Iceland's first parliament convened and founded the Icelandic Republic. A lava expanse between two gorges is the well-known Lögberg, "Law Hill," where the representatives gathered

FIG 3—View through the lava-fissure of Almannagjá out upon the plain of Thingvellir, with Thingvallavatn, the largest lake in Iceland, in the background.

for legislative purposes. A few remains of the huts in which they lived when in session are to be seen to this day, scattered all along the slope. In the Axe River is the little holm called "Duel Isle" where, in those days of chivalry and romance, men used to settle their affairs of honor.

THE WORLD'S LARGEST GEYSER

Having spent the night at the inn at Thingvellir, we continue our journey to another famous place, the Geysir. In Icelandic the geological term for "geyser" is *hver*, "Geysir" being the name of this particular geyser, the

king of them all, which has come to be applied to all the spouting wells in the world. All around Geysir there are a number of smaller wells, which you can enjoy seeing spout twenty to thirty feet in the air while you are waiting for Geysir itself, for Geysir has grown more reluctant in the past twenty years. It used to spout every hour, but since the great earthquakes in 1896, it never spouts more than three or four times in twenty-four hours. Sometimes Geysir is quiet for a day or two, if left to itself. But fifty or a hundred pounds of soap thrown into the water will produce a fine spouting within half an hour. After a few heavy booms a gigantic column of water suddenly shoots into the air, and the outburst repeats itself at frequent intervals for some ten or fifteen minutes—a display of power and grandeur baffling description. After all is over, you will still stand there, fascinated by the power that has suddenly ceased, and perhaps listlessly watch a woman who has come to boil eggs in the dead calm of the basin—for the temperature of the water is no less than 230° F.

From Geysir it is but a few miles to Gullfoss, "Golden Falls," the best-known waterfall in Iceland. It is not the highest, but is the one most abundant in water, and is, perhaps, the most beautiful, not only in Iceland but in Europe.

Volcanoes and Other Features

Going directly south, through a fair country, in a few days we reach a mountain of conical shape bearing an icy crown. It is the volcano Hekla. Were it not so remote Hekla might have been as famous in history as Vesuvius. Scientifically, Hekla is certainly the most remarkable volcano in the world. We have no record of Hekla's eruptions before the year 1004 A. D., but since that time it has had twenty-six eruptions with an average interval of thirty-five years, the longest time of inactivity being seventy-seven years. Yet, it is not Hekla that has inflicted the greatest disaster on Iceland. East of it lies the crater of Laki, which in 1783 covered an area of 218 square miles with flowing lava. Eighty per cent of the cattle, sheep, and ponies were killed, and more than 9,000 persons, or about one-fifth of the population, perished from famine and epidemics caused by volcanic gases. One of the greatest eruptions of Hekla ever recorded took place in 1845. Then sixty-seven years went by, with no sign of activity, and the scientists began to speak of Hekla as an extinct volcano. In 1912 Hekla awakened once more.

Far off, among the glaciers, lies the largest grotto in Iceland, Surtshellir. For many centuries it used to serve as a place of refuge for highwaymen and outlaws. Deep in its hiding-places there are still lying piles of bones of sheep and ponies that could not possibly be there unless brought by men. From here we ride along the glacier line, north to Mývatn, "Midge Lake." It is inferior to Lake Thingvalla in size, but not in beauty. It is twenty-one square miles in area and crowded with miniature islands, on which

hundreds of thousands of eider ducks build their nests in spring. Eider down brings in a considerable revenue to Iceland. For generations the bird has been protected by law during the whole year. That is why you can go from one nest to another and with your hands lift the duck from her eggs—so tame is she. The down is not obtained by harming the bird. She builds her nest by plucking the down from her breast and, having gathered it into a little pile, she lays her eggs in the center of it. After she has hatched her eggs and her young ones have left the nest for good, the down is taken and cleaned.

The largest forest in Iceland, Hallormsstadaskógur, is located in the eastern part of the country. There are only four kinds of trees in Iceland: birch, willow, elm, and mountain ash, none of them more than thirty feet in height. During the last generation successful cultivation of the forests was begun by the scientific protection of old trees, by the planting of cuttings of native trees in barren places, and even by the introduction of new species, as the spruce, fir, and other conifers. The country abounds in plants and flowers of such brilliancy in color and richness in fragrance as can be found only in a northern country.

At a little town on the northern coast we take the steamer, and, as the midnight sun gleams like an eye of fire above the horizon, we sail back to Reykjavik. We bid farewell to the gentle, nimblefooted, and persevering Icelandic pony which carried us faithfully and safely on this long and strenuous journey. No one can believe, without a test, how strong and trustworthy this little animal is. As time goes on and the means of travel improve, the Icelandic pony will become less and less important; but, through the people's innate love for horses, the riding pony will always maintain its character.

Industries

Farming is one of Iceland's leading industries, with sheep-raising as a prominent feature. An average farm has about ten head of cattle, fifteen ponies, and two hundred sheep; the largest has about fifty cattle, one hundred ponies, and a thousand sheep. There are more than one hundred dairies in the country. They export butter to the value of more than 1,000,000 kroners a year ($270,000). Another important industry is fishing. The fisheries around the coasts of Iceland are among the largest of the world, equal to those of the Lofoten Islands of Norway and to those of Newfoundland. In the last ten years this industry has grown with tremendous strides.

In 1915, Iceland's exports of fish, meat, butter, horses, wool, eider down, fur, and other products amounted to 55,000,000 kroners ($17,000,000). The great coal deposits, recently discovered; the enormous amount of boiling water, which could turn the barren land into a blossoming garden; the innumerable waterfalls, capable of running hundreds of factories, show

that Iceland's industrial prospects are highly promising. Two kinds of mines in Iceland are well known, the sulphur mines in the southern part, and the Iceland-spar mines in the eastern part. Iceland spar is the purest calcareous spar existing and has the quality of doubly refracting light, rendering it invaluable for optical purposes.

Dress

Icelanders dress just as other civilized nations of Europe dress. For the men there is no national dress. As to the women, things are a little more complicated. While the majority in the cities dress just as their sisters do on the Continent, the women in the country still wear the Icelandic national costumes. The women wear as a rule two kinds of costume, an everyday dress, mostly in black, and the festival attire, which is a dress of blue or black velvet or cloth, embroidered with golden filigree around the sleeves and neck. The hair is worn loose, under a crownlike headdress, fastened with a round thin diadem of gold, and is draped into a veil which hangs down the back below the heavy gold belt around the waist. Sometimes the dress is simply of white taffeta or satin. However, the young girls of Iceland do not seem to like the national costume any longer. They have abandoned the sentiments of their grandmothers and aim to do away with their fashions in clothes also. They have fought for their enfranchisement and won it easily. In the new constitution, of June, 1916, Icelandic women were granted the right to vote.

Government

Iceland's political history began in the year 930 A. D., when the old republic was founded. This form of government lasted till Iceland, in 1263, came under the rule of Norway. When Norway became part of the kingdom of Denmark seventeen years later, Iceland also became a part of that kingdom. By the Treaty of Kiel, in 1814, Norway was separated from Denmark, but Iceland was retained by the Danes. Thus the Danes have practically ruled the country for more than six centuries, a period, which, down to the year 1854, was continuously distressful for Iceland. Nature, of course, had a large share in producing the misery and darkness of that time; but more disastrous than all the plagues, volcanic eruptions, and earthquakes together, was the pressure of commercial monopoly inflicted by the Danish government. The people of Iceland were left to the mercy of unscrupulous traders for more than two hundred and fifty years. Not only were the people obliged to deal exclusively with Danish merchants or those who had bought the trade privilege from the Danish government, but every farmer and fisherman was compelled to deal only with a merchant of his own county, even though the merchants could not supply them with sufficient food. If a man tried to sell three or four fish outside his county

and was detected, he was immediately stripped, bound to a pole, and flogged till the blood flowed. In 1854, Icelandic statesmen at last succeeded in having this abominable form of trade abolished, and from that year, which marked the beginning of an era of general progress, the people of Iceland have maintained a ceaseless fight for their political freedom. The father of this political reconstruction was the great statesman and historian, Jón Sigurdsson (1811-1879). He was president of Parliament for more than

FIG. 4—Scene on the eastern coast. Note the settlement clinging to the narrow foreshore at the foot of the mountain which slopes abruptly to the sea. (Courtesy of Henry E. Ferguson.)

twenty years, and he is still popularly called in Iceland "the President." He provided Iceland with a tolerably good constitution in 1874 and laid down the principles of the great political reform introduced in November, 1903, by which Iceland became a self-governing country under the protection of the Danish King.

The Althingi, or Parliament, is composed of a Senate, with fourteen members, and a House of Representatives of twenty-six members. All forty members are chosen by popular vote and, when they assemble, choose the senators from their own number. Acts of Parliament are signed by the King of Denmark and countersigned by the Icelandic Prime Minister, who is chosen by Parliament. The legislative power is thus entirely independent of Denmark, and so also is the judicial power. The Supreme Court is located in Reykjavik and consists of two judges and a Chief Justice.

Language, Literature, Art

The language of the Saga—the ancient literature of Iceland—is the same tongue which was spoken a thousand years ago in all the Scandinavian countries, Denmark, Norway, Sweden, and Iceland. But while it is now a foreign language to Danes, Swedes, and Norwegians, it still lives in Iceland, and these sagas are generally the first books the children read. Icelandic, like the other Scandinavian languages, is of Teutonic origin, a sister tongue

Fig. 5—Hvammur on Skagá Fiord on the northern coast. Note in the foreground the carefully kept pasture from which the stones have been removed and heaped into neat piles. (Courtesy of Henry E. Ferguson.)

to German and to English, though the latter is largely influenced by Greek, Latin, and French. You would have no difficulty in tracing the relationship in a sentence like this:

English: If you will give me a glass of water, I shall be thankful. . .
Icelandic: Ef thú vilt gefa mér glas af vatni, skal ég vera thakklatur.

Literature has always been fostered in Iceland. An English statistician has calculated that the annual publication of books in Iceland is proportionately twenty-five times as great as that of the whole British Empire. But the tragedy of being an Icelandic author lies in the fact that the language, though highly cultivated, is spoken and read by fewer persons than any other modern language. If it were as widely spoken as German, or even Swedish or Danish, some of our lyric poets would long ago have gained the same recognition as Heine, Tegnér, or Drachmann. Still, nearly twenty

Icelandic authors of the nineteenth century have had their works translated into the different European languages, some of whom are: Jónas Hallgrímsson, the Wordsworth of Iceland; Steingrimur Thorsteinsson and Matthias Jochumsson, translators of Shakespeare and many English and German classics; Gestur Pálsson and Einar Hjörleifsson, realistic novelists; Einar Benediktsson, a lyric poet; and Indrith Einarsson, a contemporary dramatist.

Certain authors have marked a new era in Icelandic literature. Dissatisfied with writing merely for their own people they definitely broke tradition and, living in Copenhagen, began to write in Danish or bilingually in Danish and Icelandic. This effort of four poets of the younger generation has been crowned with remarkable success. Two of these, Gunnar Gunnarsson and Jónas Gudlaugsson, are novelists who have gained unqualified recognition abroad. But it is drama that has gained the greatest recognition. Indeed, for years, no plays have been welcomed in Denmark with such enthusiasm as the modern Icelandic. Johann Sigurjónsson has written four plays, some of which have found cordial appreciation in foreign countries.

Of Icelandic composers the best known, Sv. Sveinbjörnsson, has lived in Edinburgh for over forty years. He is the author of the Icelandic National Hymn and has written music to a number of English and Icelandic songs. Iceland has at least half a dozen prominent painters. The greatest sculptor is Einar Jónsson. His latest work—a monument commemorating the Icelandic explorer Karlsefni, who landed in America a thousand years ago—is to be erected in Philadelphia.

There are two men of world-wide fame, one an artist, the other a scientist, whose fathers were Icelanders: Albert Bertel Thorvaldsen and Neils Finsen. Finsen, the great physician, who discovered a cure for certain diseases by decolorized light rays and received the Nobel Prize in 1903, belonged to a well-known Icelandic family. He spent his youth in Iceland, graduated from the college of Reykjavik, and then went to the University of Copenhagen.

Two Icelandic scholars are known as the greatest authorities in the so-called "Northern Science," the old and medieval mythology and literary history of Scandinavia: Finnur Jónsson, professor at the University of Copenhagen, and Dr. Björn M. Ólsen, professor at the University of Reykjavik.

A man of great celebrity in scientific circles is the Icelandic geologist, Dr. Thorvaldur Thoroddsen, the first man to write the geographical history of Iceland.[1] The youngest scientist is Dr. Gudmundur Finnbogason,

[1] The most accessible of his major works to the non-Icelandic reader are perhaps:
Geschichte der isländischen Geographie (transl. into German by August Gebhardt), 2 vols. to date, Leipzig, 1897-98. [Cover period to 1750.]
Explorations in Iceland during the Years 1881-98, *Geogr. Journ.*, Vol. 13, 1899, pp. 251-274 and 480-513.
Island: Grundriss der Geographie und Geologie, *Ergänzungshefte zu Petermanns Mitt. Nos. 152-153*, Gotha, 1905-06. [With a hypsometric and a geologic map, 1:600,000.]—EDIT. NOTE.

a philosopher whose work has won high commendation from Henri Bergson.

There is one Icelandic name, known in America above all others,—that of the explorer, Vilhjálmur Stefánsson. He was born in Canada, but his mother tongue is Icelandic, both his parents being Icelanders who emigrated forty years ago.

National Destiny

The chief national aim of the Icelandic people, like the aim of every nation, should be, it seems to the writer, the development to the highest degree of that in which she may excel in the competition among nations. Wherever progress is dependent on numbers, it is evident that she will not be able to compete with other countries. But there is one sphere in which she may equal if not surpass other nations in the progress of civilization. That is in the sphere of literature and art. Not that of the ancients, for the Icelanders do not always live in the sagas. The name "Saga Land" does not even exist in Icelandic. She has not forgotten that no country has produced a greater classic literature, not even Greece. It was not Homer, but the author of Njáls Saga, who fashioned, in Skarphédinn, once for all, the perfect type of inflexible manhood, constantly meeting life's vicissitudes with a "silent sneer." It was not Sophocles, but the author of Laxdala Saga, who fashioned, in Gudrún, once for all, the perfect type of the intricate nature of woman, "spinning twelve yards of yarn" while she made her husband go to battle against her lover. But it is the Icelandic Renaissance, the art and literature of our own age, blossoming from the roots of this past, through which Iceland may be rescued once more from obscurity. It is in the sphere of art, if in any sphere at all, that this little nation will be able to display her greatness. For in national life, as in art, it is quality, not vastness, the intention, not the extension, which counts. After all, is not art the only thing immortal? When one contemplates what Iceland has suffered, and yet what she has achieved, what she is today, one can well understand the strange sense of pride that an Icelander may feel in belonging to the smallest of all nations.

SOME INTERESTING GEOGRAPHICAL PROBLEMS IN THE EXPLORATION OF NORTHERN CANADA

By CHARLES CAMSELL
Geological Survey of Canada

Of the habitable portion of the globe northern Canada contains a very large area of imperfectly known or wholly unexplored territory, and in this are many fascinating problems requiring solution by the adventurous wanderer in the silent places of the earth. Because this territory is all more or less habitable, and its exploration not unlikely to be rewarded by discoveries of mineral resources of great value, it is incumbent on Canadians in particular to make some effort to dispel the darkness of ignorance and fill up some of the blank spaces that appear on the map of northern Canada. The field is wide, the problems numerous, the work exceedingly fascinating, and the results always worth the effort.

In a recent paper[1] the writer attempted to show what geographical work yet remains to be done, and the necessity for doing it, and estimated that, out of a total area of continental Canada of about 3,209,000 square miles, about 900,000 square miles must still be considered as unexplored. This unexplored area is contained in some thirty blocks ranging from 5,000 to over 70,000 square miles in extent and occupying much of the Labrador peninsula and the North West Territories.

Up to the end of the nineteenth century the Geological Survey of Canada had been very active in carrying on exploratory work, and after a period of several years quiescence an exploration program was again arranged only to be interrupted by the outbreak of the war in 1914. In that year part of the work of the Geological Survey consisted in the exploration by the writer[2] of about 350 miles of a hitherto unknown river, the Taltson, flowing into Great Slave Lake and draining a great part of the country east of the Slave River.

In 1915 F. J. Alcock[3] mapped the lower part of Churchill River and in 1916 A. E. Cameron[4] solved an interesting geographical problem by delineating the northern shore line of the western arm of Great Slave Lake. This shore line was marked on the map of Canada in broken lines and though traversed by Alexander Mackenzie[5] in his voyage of discovery down

[1] Charles Camsell: The Unexplored Areas of Continental Canada, *Geogr. Journ.*, Vol. 48, 1916, pp. 249-257. [Abstracted below, under "Geographical Record."]

[2] Charles Camsell: An Exploration of the Region between Athabaska and Great Slave Lakes, *Summary Rept. Geol. Survey of Canada for 1914*, pp. 55-60.

Idem: An Exploration of the Tazin and Taltson Rivers, North West Territories, *Geol. Survey of Canada Memoir 84*, Ottawa, 1916.

[3] F. J. Alcock: Lower Churchill River Region, Manitoba, *Summary Rept. Geol. Survey of Canada for 1915*, pp. 135-136. See also *idem*: The Churchill River, *Geogr. Rev.*, Vol. 2, 1916, pp. 433-448.

[4] A. E. Cameron: Reconnaissance on Great Slave Lake, *Summary Rept. Geol. Survey of Canada for 1916*, pp. 66-76.

[5] Alexander Mackenzie: Voyages from Montreal on the River St. Laurence through the Continent of North America to the Frozen and Pacific Oceans in the Years 1789 and 1793, London, 1801, pp. 7-22.

the Mackenzie River in 1789 and by the voyageurs of the Hudson's Bay Company en route from the Mackenzie to Fort Rae, had never been even approximately outlined. Mr. Cameron's survey places the shore line some distance farther north than the supposed location and cuts off much of the big point that separates the west arm from the north arm, enlarging the area of the lake by about 2,400 square miles.

Great Slave Lake

The complete delineation of the shore line of Great Slave Lake is one of the most obvious geographical problems demanding solution in this region. The lake is said to have a superficial area of about 13,000 square miles and a total length of nearly 300 miles. Up to the present time the western arm is the only portion that has been fairly accurately outlined, this having been done by W. Ogilvie in 1888[6] and A. E. Cameron in 1916. The north arm still requires some surveying before its shores may be said to be fairly well mapped, and this will be no simple undertaking because of the thousands of rocky islands that border its eastern shore. The shore line of this arm as it appears on the maps of Canada is the work partly of one of the Franklin expeditions[7] and partly of J. M. Bell[8] of the Geological Survey. The eastern arm of the lake has been partly mapped by a number of explorers from the time of Captain Back[9] in 1833 down to the expeditions of J. W. Tyrrell[10] in 1900 and E. T. Seton[11] in 1907; but since most of these travelers followed the same direct route to the east end of the lake much of the shore line, particularly on the south side where it is indented by deep bays, has never been mapped or described.

Caribou Plateau

Another problem of deep interest, not only to the geographer but to the geologist and physiographer as well, is presented by the large blank space on the map immediately north of the Peace River between Hay River and the 114th meridian of longitude. Approximately 10,000 square miles of this blank space is occupied by a high plateau, locally known as Caribou Mountain, standing nearly 2,500 feet above the general level of the country

[6] William Ogilvie: Exploratory Survey of Part of the Lewes, Tat-on-duc, Porcupine, Bell, Trout, Peel, and Mackenzie Rivers, 1887-88, Part 8 of the *Annual Rept. Dept. of the Interior for 1889*, Ottawa, 1890.

[7] John Franklin: Narrative of a Journey to the Shores of the Polar Sea in the Years 1819, 20, 21, and 22, London, 1823; see pp. 198-201 and section of three-sheet detailed map embracing the part of the route comprised between Isle à la Crosse and Fort Providence.

[8] J. M. Bell: Report on the Topography and Geology of Great Bear Lake and of a Chain of Lakes and Streams Thence to Great Slave Lake, Report C of *Annual Rept. Geol. Survey of Canada*, Vol. 12 for 1899, Ottawa, 1902.

[9] [George] Back: Narrative of the Arctic Land Expedition to the Mouth of the Great Fish River and Along the Shores of the Arctic Ocean in the Years 1833, 1834, and 1835, London, 1836; see Chapter 3 and the accompanying map.

[10] J. W. Tyrrell: Exploratory Survey between Great Slave Lake and Hudson Bay, Appendix No. 26 to Part III of *Annual Rept. Dept. of the Interior for 1900-1901*, Ottawa, 1901; see pp. 108-110 and Sheet No. 1 of 22-sheet map accompanying report in pocket.

[11] E. T. Seton: The Arctic Prairies: A Canoe-Journey of 2,000 Miles in Search of the Caribou, Being the Account of a Voyage to the Region North of Aylmer Lake, New York, 1911; see maps on pp. 180-181.

to the east and north of it, and about 2,000 feet above the country to the south and west. With the exception of Sergeant R. W. Macleod[12] of the Royal North West Mounted Police, no white man to my knowledge has ever crossed the plateau, although it is easily accessible and plainly visible, 20 to 30 miles distant, to the traveler on the Peace River from almost any point between Fort Vermilion and Peace Point. This is very strange when we consider that the Peace River has been used as one of the main highways of the north country for nearly 130 years. In 1914 J. R. Akins[13] of the Dominion Topographical Surveys surveyed the 29th base line across the southern face of the plateau, reaching an elevation of 3,207 feet above the sea on that line. On the west travelers have not been nearer the plateau than the Hay River; and on the east the writer[14] in 1902 made a reconnaissance trip along the base of the plateau following the Little Buffalo and Jackfish Rivers by canoe. On the north the plateau is not visible from the shore of Great Slave Lake but was seen by A. H. Mellor[15] of the Royal Northwest Mounted Police when he ascended Buffalo River to Buffalo Lake in 1910 and by A. E. Tameron of the Geological Survey in 1917.

The slope up to the top of the plateau from the south is gentle but on the east and north is fairly steep. The crest line from all points of view is even and unbroken by any sharp peaks. Sergeant Macleod describes the top as rolling, dotted with lakes of all sizes, and covered by a stunted growth of spruce about 10 feet high. Macleod's traverse across the plateau was made with dog teams in December and January when snow lay deep on the ground and he was, therefore, unable to determine what the soil or bedrock was. The surface, however, he says is heavily moss-covered. He speaks of crossing a large lake about the size of Lesser Slave Lake, i. e. about 60 miles long, and lying near the southern edge of the plateau. This lake is still unmapped. This and the other lakes are said to be stocked with whitefish, and caribou roam all over the plateau. The plateau is quite uninhabited and is only visited for a short period of the year by Indians who go in the autumn to the large lake mentioned by Macleod for the purpose of fishing. The reason for this is that in winter it is a most inhospitable region because of its lack of timber, and in summer the mosquitoes and flies are said to be worse than in any other part of the north country.

Stray prospectors have been attracted to it by the report that a placer miner had found gold on one of the streams flowing out of the mountain. Partly to investigate this story and partly to do some general prospecting two well-known British Columbia prospectors traveled into the borders of the country by way of the Jackfish River in the summer of 1915. On the writer's way up the Peace River in September, 1916, he made inquiries for

[12] Appendix U, *Rept. Royal Northwest Mounted Police for 1911*, pp. 180-181.

[13] *Annual Rept. of the Topogr. Surveys Branch for 1914-15*, Dept. of the Interior, Ottawa, 1916, pp. 67-68; on accompanying sheet is a small map showing type of soils and forest covering and a profile.

[14] Charles Camsell: The Region South-west of Fort Smith, Slave River, *Summary Rept. Geol. Survey of Canada for 1902* (= Report A of Annual Report, Vol. 15 for 1902-3), pp. 151 A-169 A.

[15] Appendix T, *Rept. Royal Northwest Mounted Police for 1910*, pp. 197-200.

these men but failed to get any news of them other than that they had been seen by Indians near the head of the Jackfish River in the autumn of 1915 and that their supplies of food were low and one of them was ill. What their fate has been he could not learn. The unknown had for them the same strange and compelling fascination that draws so many prospectors and explorers into the most remote and forbidding corners of the earth. These men apparently failed, and the problem of the Caribou Plateau is still unsolved. It is inconceivable, however, that the plateau will remain unexplored much longer as it has become easily accessible since the railway reached the Peace River at Peace River Crossing in 1915. It is clearly visible from Fort Vermilion—a point which can be reached in three days from Edmonton by rail and steamboat, but how to cross the plateau in summer may require careful planning.

Among the questions that require answering by the explorer of the Caribou Plateau are: What is the area of the plateau and what the geography of its surface? What is its origin and why should it stand out in the central plain of the Mackenzie basin, like a great monadnock, rising some 2,000 feet above it and separated by a hundred miles from the Laurentian Plateau on the east and by several hundreds of miles from the Cordillera on the west? Is it a horst of the Laurentian Plateau built out of granites or gneisses, or, as is more likely, is it composed of younger—perhaps Cretaceous—rocks, an erosion remnant like Birch Mountain or the Buffalo Head Hills to the south of it?

Headwaters of Thelon and Taltson Rivers

Immediately north of Lake Athabaska, between the Doobaunt and Taltson Rivers and extending down the Thelon River, is another large block of unexplored territory, 47,000 square miles in extent, which up to the present has only been traversed—so far as known—by one white man. Samuel Hearne[16] crossed this block of territory from south to north in 1771 on his way to the Coppermine River, and again on his return in 1772 he traversed it from west to east. For one hundred and forty-five years no one has attempted to verify Hearne's evidently inaccurate geographical results or to map the other physical features of a region apparently full of interest. Richard King proposed to pass through this region on his way to the north in an expedition which he planned while returning with Captain Back from the exploration of Backs River in 1835. In his book[17] he publishes an Indian sketch and a description of a route which leaves Lake Athabaska at the Charlot River, descends the Tazin River to the mouth of the Taltson,

[16] Samuel Hearne: A Journey from Prince of Wales's Fort in Hudson's Bay to the Northern Ocean Undertaken by Order of the Hudson's Bay Company for the Discovery of Copper Mines, a North West Passage, etc., in the Years 1769, 1770, 1771, and 1772, London, 1775 (reprinted as Publication VI of the Champlain Society, Toronto, 1911, which see for a reconstruction of Hearne's route on a modern map, his original being distorted, as it was based on dead reckoning and not on astronomical observations).

[17] Richard King: Narrative of a Journey to the Shores of the Arctic Ocean in 1833, 1834, and 1835, under the command of Captain Back, 2 vols., London, 1836; reference in Vol. 2, p. 389.

and ascends that stream crossing the divide to the headwaters of the Thelon River.

This block of unexplored territory is forested on the south and west, but extends well into the Barren Grounds. It includes part of the basins and the headwaters of two large streams, the Thelon River, emptying east into Hudson Bay, and the Taltson River, draining north to Great Slave Lake and thence to the Arctic. The lower courses of both these streams have already been mapped—the Thelon by D. T. Hanbury[18] and J. W. Tyrrell,[19] and the Taltson by the writer[20]—but the source of each of these streams is still unknown. When we consider the ease with which this region can be reached it is surprising that we know so little of it. Our maps show a string of lakes in dotted lines extending in an east and west direction across it along the line of travel taken by Hearne, and this is the sum of our knowledge.

This block is a part of the Laurentian Plateau and consequently a region of lakes. Its exploration, therefore, could be undertaken in canoes by following the watercourses. Indian canoe routes lead into it from two points on Lake Athabaska, one starting from Fond du Lac at the east end of the lake and the other from a point near Black Bay. The writer explored part of the latter route in 1914, crossing from Lake Athabaska to the Taltson River watershed and descending the Tazin River down to its junction with the Taltson. Instead of going eastward up the Taltson and crossing the divide to the Thelon, as King proposed and as the writer originally intended to do, he continued down stream to Great Slave Lake. The route from Fond du Lac is a difficult one, requiring many portages, but is regularly followed by the Chipewyan Indians of Fond du Lac on their way to their hunting grounds. A canoe route used by the Caribou Eaters runs eastward from Fort Smith or Fitzgerald, while the Dogribs of Great Slave Lake enter the region either by way of the Taltson River or from other points on the eastern arm of the lake. All the Indian canoe routes converge at a point on the edge of the Barren Grounds about the headwaters of the Thelon River, and the Indians from Lake Athabaska, Great Slave Lake, and the Slave River are in the habit of congregating in that locality in August every year to hunt caribou, which are said to pass there in thousands.

The rendezvous is apparently an Indian paradise for game. It is referred to by Hearne as a locality "remarkably favourable for every kind of game that the barren ground produces at the different seasons of the year." He also says that he has "not seen or heard of any part of this

[18] D. T. Hanbury: Sport and Travel in the Northland of Canada, London, 1904; see Chapter 4 and accompanying map in 1:3,500,000.

Idem: A Journey from Chesterfield Inlet to Great Slave Lake, 1898-9, *Geogr. Journ.*, Vol. 16, 1900, pp. 63-77, with map, 1:2,000,000.

Idem: Through the Barren Ground of North-eastern Canada to the Arctic Coast, *Geogr. Journ.*, Vol. 22, 1903, pp. 178-191, with same map, 1:3,500,000, as that which accompanies the book.

[19] Work cited in footnote 10, pp. 121-122.

[20] Work cited in footnote 2.

FIG. 1.

FIG. 2.

FIG. 1—Hill Island Lake, until 1914 unexplored since Samuel Hearne crossed it in 1772 on his return journey to Hudson Bay after his expedition to the Coppermine River. Characteristic topography in the basin of the Taltson River, southeast of Great Slave Lake.

FIG. 2—Chipewyan Indians building birch-bark canoes on the same model and with the same kind of materials that Hearne's Indians used nearly one hundred and fifty years ago. (Photos from the Geological Survey of Canada.)

country which seems to possess half the advantages requisite to a constant residence that are ascribed to this little spot." Caribou are said to visit this part of the country in "astonishing numbers" both in spring and autumn. Ducks, geese, and swans are also plentiful at those seasons, and he refers to a species of partridge said to be as large as English fowls, though he will not vouch for the truth of this. The rivers and lakes, too, "abound in fine fish, especially trout and barble." This is no doubt the reason why the Indians still make such long and arduous journeys every year to reach it, for it means to them food and clothing in abundance with a minimum of effort in obtaining them after having reached there.

J. W. Tyrrell[21] speaks of this oasis as extending down the valley of the Thelon River far into the Barren Grounds, though the Indians have long since abandoned the more northern portion and make their present rendezvous about the headwaters of the Thelon River, and in the region where Hearne and his horde of Chipewyan savages passed the spring of 1771 building canoes and preparing for their long march to the Coppermine River and a raid against the Eskimos. It is no doubt true that the locality where the Indians make their rendezvous abounds in game, but it is also true, as proved by the writer's own experience in 1914, that the country bordering it on the south and west is, with the exception of fish, particularly destitute of every kind of game, and the explorer must count on traveling many days from Lake Athabaska before he will be able to obtain caribou.

The purely geographical results to be obtained by the exploration of this region are particularly interesting, but it has an historical interest as well. One would no doubt find a great deal of hard work and much excitement in navigating the rivers of the region with their numerous rapids and falls, but there is also something very attractive in the Barren Grounds in summer time and the sparsely timbered country bordering it, known to the Indians as "the land of little sticks." It is not only the game that attracts the Indians to this region. To them it is not merely a land of plenty, but to those of them who live most of their lives in the forest it is a land of beauty, with a charm in the summer time not to be found anywhere else except perhaps in the high mountains about the timber line. That this fascination exists is acknowledged by everyone who has traveled in "the land of little sticks." To the Indian it is expressed in the words[22] of Saltatha, Warburton Pike's faithful companion and guide in his exploration north of Great Slave Lake, when he asks the old priest who is explaining to him the beauties of heaven:

> My father, you have spoken well; you have told me that heaven is very beautiful; tell me now one thing more. Is it more beautiful than the country of the musk ox in summer, when sometimes the mist blows over the lakes, and sometimes the water is blue, and the loons cry very often? That is beautiful; and if heaven is still more beautiful, my heart will be glad, and I shall be content to rest there till I am very old.

[21] Work cited in footnote 10, pp. 121-122.

[22] Warburton Pike: The Barren Ground of Northern Canada, London, 1892, p. 276.

These are some of the most obvious problems demanding solution in the geographical exploration of northern Canada, and the difficulties and compensations attached to them. Farther north in the Cordillera, in the Mackenzie lowland, and in the Laurentian Plateau on either side of Hudson Bay are many others equally interesting and promising as rich a reward to the adventurous explorer who has the time, energy, and opportunity to undertake their solution.

THE RACIAL HISTORY OF THE BRITISH PEOPLE[1]

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The Three Races of Europe

The idea of the three European races, Nordic, Alpine, and Mediterranean, which Ripley has done so much to expound, has received very general assent. The Nordic and Mediterranean probably represent divergent accumulations of characters among mixtures of the ancient long-headed stocks discussed by the students of primeval man. The Alpine stock, on the other hand, represents a westward spread through the mountain zone of Europe, and, as mountain countries inevitably tend to export population, it has spread downhill and has met and sometimes pushed back, sometimes fused with, the long-headed stocks on the flanks of its home.

Mediterranean

The dark, rather short, long-headed Mediterranean is characteristic of the coast lands of the western part of the Midland Sea, but it has representatives in the southern Aegean and it may have immigrated into Greek coastal valleys from the Bronze Age onwards. In this region it has had age-long relations with Africa, and the climate has been warming on the whole since the end of the Ice Age. From this region, again, it spread up northward, probably as the ice retreated, mainly through western France. The Rhone valley, heavily forested as soon as the climate permitted, was difficult; the Carcassonne gap, with a good deal of limestone near by, remained more open. In this way, with northward movement, the type reached Britain, probably before it had its Mediterranean characteristics very fully developed.

Nordic

The tall, strong-boned Nordic, with his fair hair and blue eyes, probably represents a type evolved in the region north of the great Eurasian mountain zone, where, in early human times, it would appear that tundra gave

[1] For the detailed evidence on which rest the chief conclusions of this article, see the following papers:
(1) H. J. Fleure and W. E. Whitehouse: Early Distribution and Valleyward Movement of Population in South Britain. *Archaeologia Cambrensis*, 6th Ser., Vol. 16, 1916, pp. 101-140; with bibliogr.
(2) H. J. Fleure and T. C. James: Geographical Distribution of Anthropological Types in Wales, *Journ. Royal Anthropol. Inst. of Great Britain and Ireland*, Vol. 46, 1916, pp. 35-153.
(3) H. J. Fleure: Ancient Wales: Anthropological Evidences, *Trans. Hon. Soc. of Cymmrodorion*, Session 1915-16, pp. 75-164; with bibliogr.

For a general discussion of the questions of British ethnology treated in this paper see:
Arthur Keith: The Antiquity of Man. London, 1915.
T. Rice Holmes: Ancient Britain and the Invasions of Julius Caesar. Oxford, 1907.
J. Déchelette: Manuel d'Archéologie. Paris, 1912-14.
G. Dottin: Manuel Celtique. 2nd edit., Paris, 1915.

place to cold steppe and forest, the last on the whole replacing the others as the ages passed. In Britain we have, as it were, an overlap of the provinces of these two races, and it is probable that we are best advised in speaking of an important element of the British population as neither Nordic nor Mediterranean in the full sense, but as a survival of old long-headed types remaining incompletely differentiated into one or the other but influenced by later immigrants of both these stocks.

Alpine

The thickset, broad-headed Alpine race (Alpine-Armenoid might be more correct) occupies the mountain zone, and we may distinguish broadly a Pyrenean-Cevenole Alpine variety, a Slavonic variety (especially North Slavonic) with less dark coloring, and an Illyrian and Anatolian variety with the height of the head much accentuated.

Intermediate Types

Northeastern

On the south, the mountain zone, e. g. in Italy, grades somewhat abruptly into the coastal country where Mediterranean man is at home, but on the north the mountains are flanked by broken highlands in the intricate and long-forested river basins of which Alpine man has for centuries been busy making clearings. In this region he has mixed with the Nordic while on the whole pushing him back, as the farmer does the backwoodsman. Here therefore have arisen mixed or graded types. These intermediate types combine something of the breadth of head of the central or mountain type with a great deal of the fair coloring and strength and length of bone of the Nordic. Of special importance for Britain are certain people traced as a wave of migrants from western Russia, perhaps the province of Kiev, south of the Pinsk marshes, along the European plain to Britain in the days heralding the Bronze Age. These people are traced by their beaker pottery and are thence often called for convenience the Beaker men. They seem to have been tall, broad-headed, strong-browed, and rough-boned; and it is quite likely that the type arose as an intermediate through intimate contact of small groups of broad-heads beginning to make, and to settle in, forest clearings and ultimately mingling with Nordic forest wanderers.

Northwestern

The above is the most characteristic of the intermediate types on the northeast of the mountain zone. Other types of intermediate character seem to have arisen in the tangle of hills and valleys to the northwest of the mountain zone. They are mostly big men with strong bones, having broad heads from their mountain ancestors and long faces with strong chins from their forest kin. Many of them seem to be red. Among these mixed

types we include the traditional Flemings, the type "Lorrain" and the Kymris of French authors, the Belgae and the red Caledonians of Latin authors, the typical "Anglo-Saxon" of some writers, and many more. They are specially related to the movements of men with leaf-shaped swords—the movements of the western early Iron Age and of post-Roman times. Perhaps it would be best to describe the Slavonic peoples as the corresponding mixed types on the northeast flanking of the European mountain zone, at any rate from the Iron Age onwards. As there is some ground for associating the root language of Slavonic with the northeastern mixture, we are not surprised to learn from linguistic students that these two root languages are akin and probably represent divergences from a common origin.

Southern

On the southern flank of the mountain zone the broad-heads have spread downhill towards the Mediterranean but in some parts have come down as a solid block and have made contact with a solid block of the older long-headed type, with its very different traditions. Such conditions do not favor the rise of an intermediate type, as does the intimate mixture resulting from more intimate fractionated contact. There is, however, an intermediate type, Mediterranean, with an Alpine jaw.

There is ground for thinking that, on the Aegean coast, with mountain valleys and islets closely linked, an intermediate type has arisen with broad head, dark coloring, and stalwart build, like the Illyrian mountaineer but without his peculiar height of head and with several small hints of kinship at the same time to the Mediterranean race. This intermediate type may have played a part in the life of western Europe for some thousands of years, mainly owing to its activity in the old coastwise navigation and the development of fisheries and of seamanship thence resulting. We note its importance on those parts of the British coast which are interested in Iceland fisheries. It would be a great thing for western Europe if the old coastwise life, helped by intensive cultivation near the warm water, could be revived. It would renew the social health of many coast towns; it would provide recruits for fisheries and mercantile marines, as well as war navies; and it would give this interesting type its much-needed opportunities to make its best contribution to humanity.

Moorlands in Britain

Early Life

Had we been able to visit Britain, let us say, when it had recovered from the Ice Age we should have found it a forest-clad peninsula, in the main, probably still linked to Europe by a low isthmus in the region of the present Straits of Dover. Certain parts of it, whether because of the porous soil or rock or because of their exposure to the sea winds, would have been bare,

and man, armed only with stone tools, would have been restricted almost entirely to these bare patches. How could he fight the damp forest till he had metal with which to cut down its trees? Then, too, the forest and swamp were the haunts of wild beasts—cattle will still run, they say, if one

THE HABITABLE AREA
OF SOUTHERN BRITAIN
IN NEOLITHIC TIME
Swamp and forest, practically unoccupied
Elevated and rocky tracts difficult of occupation
Open, habitable areas
Approximate position of Neolithic coast line according to W. Boyd Dawkins
Scale of miles
10 0 20 40 60 80 100
THE GEOGR. REVIEW, MARCH 1918

FIG. 1—Sketch map showing the habitable area of southern Britain in Neolithic time. Scale, 1:4,700,000. Redrawn from a map facing p. 83 of paper (3), cited in footnote 1. The first, slightly different version of this tentative map, based in part on the work of W. Boyd Dawkins, accompanied paper (1). Several small modifications have since been suggested in a note entitled "A Map of Primitive Britain," *Geogr. Teacher*, Summer, 1917, number, pp. 85-87.

attempts a wolf howl in their vicinity—and we find that the wild boar was the emblem of death in some Celtic traditions; both facts are significant of the terrors of the dark woodland. Add to this again the ague that probably haunted the swamps in those days, and we have sufficient reason for thinking of those who came into Britain after the Ice Age as, in the main,

moorland dwellers. Now we have on the moorlands of Britain almost everywhere the works and memorials of our forefathers, though we have been taught too often to look upon them as the remains of a vanished race, and it is interesting to try to glimpse a little of the life of those days, if only to see what it has bequeathed to us.

Moorland Areas

The most important of the moorlands of South Britain was undoubtedly the Downs country, where the round hills stand bare both because of exposure and because trees will not grow naturally on the porous chalk unless it be covered with other material. The Downs country was important because it afforded a great extent of pasturage, because it permitted travel from pasture to pasture along its even ridges, and most of all because it contained rich supplies of flints for weapons and tools.

In the Chilterns and in East Anglia the chalk was much covered by forested boulder clay, that is, by débris left after the retreat of glaciers. The chalk is thus exposed chiefly in the valleys, and it is in them rather than on the heights that we find traces of our Stone Age ancestors.

From the Western Downs there were open hill lines leading along the Blackdown Hills to the moorlands of Devon and Cornwall, along the Mendips to the coast, and so across to Barry and South Wales, over what may have been a sand-dune country, but is now the Bristol Channel, and along the Cotswolds to the Northampton Heights. None of them had any wealth of flints, but the far west had stone which men learned to grind into axe heads, and thus the west country became a famous Stone Age center. The Midlands were then, as ever, "sodden and unkind," but there were more open patches on the Chases round about Birmingham and also small ones in Leicestershire. The southern Pennines were an important open space, but farther north the habitable zone was restricted because so much of the country was very high and rocky. The Lincolnshire Hills, the Yorkshire Wolds, and the North York Moors to a lesser extent were habitable. These English areas were sharply divided from Wales by the great forest-and-swamp barriers of Dee and Severn. In Wales some coastal moorlands had a comparatively delectable climate, and there was some flint to be got on the beaches; the open country inland was for the most part very high and bleak. Of coastal moorlands, one notices especially the sunward slopes of the hilltop expanses of Glamorgan, full of traces of early man, moorlands isolated by great forests from the Cotswolds and, later on, by sea from the Mendips. It is an area of ancient isolation, where the Silures maintained themselves so long against the Romans, and where persists a certain type of tradition—an intractability that contributes not a little to the troublesome misfit of the South Wales coalfield in a social polity evolved largely on the English plain.

Descendants of Neolithic Britons

It is in the valleys around these ancient open spaces that we still find the descendants of the Neolithic people. The population has left the moorland to its sacred memories; it is the hallowed land of All Souls, and its whilom shepherds are now in great part industrialized in the slum lines along the valleys around the Pennines and in South Wales. On the English plain the old population is generally found nowadays on the bad lands, whether it be on Romney Marsh, or in the poor parts of the fens, or on the sandy heath and woodland patches, as, for example, between Salisbury and the New Forest.

These descendants of the Neolithic folk are the long-headed, long-faced, dark-haired, brown-eyed people that form so strong an element of the population of big English cities. They seem better able than all other types to withstand slum conditions, so that in the second generation of great-city life they have arisen in their millions to form once more, after many days, almost a majority, perhaps, of the population of South Britain. That they have begun to oust the typical John Bull in the Continental descriptions of the Englishman tells an important tale, and we appreciate the fact that it must be extremely difficult to displace a population which is attached to the land. The physique of the early British population, perhaps improved by better food, is thus abundantly amongst us at the present day, but that is not all; ever so many details of our life owe their character to that far-off period.

Origin of May Day and All Souls

It was difficult work observing the sun and stars in a cloudy land like Britain, and perhaps astronomical observations came into importance later on when trade with sunnier climes began, towards the end of the Stone Age. But spring and autumn have glorious associations in nature in Britain, and must have been a pageantry of paradise in those ancient times. The woodland was largely oak and birch and ash, with alder in swampy places, and pine also here and there; but along the upper edge of the woodland, festooning the rocky knolls, must have flourished the thorns and the gorse bushes, with fern on the moorland above.

In the middle of May the new leaves of the forest would be a sea of green, fringed above with a white and foaming crown of thorns in bloom, while the gorse would flame the hillsides with its scented gold. Spring in Britain is still one of the wonders of the world, but its glories when history was young and the land was still untamed must have been almost more than poets have conceived. Likewise autumn, with its red russet of the bracken and its many-tinted leaf browns, reached its short but wonderful zenith towards the middle of November. These two glories marked the great festivals of May Day and All Souls, and if the change of eleven days in the eighteenth century confused the issue a little, there is still enough of the

old tradition left for us to guess its former importance. In western Wales the houses are let and the farm servants hired about November 12, the old festival of All Saints. Even in England in 1915, in spite of war and poverty, it was necessary to issue regulations against fireworks on November 5, the decayed celebration, not so much of the Gunpowder Plot fiasco, as of the burning of the old year.

Other Inheritances

Old earthworks on the moorland give their names to the hundreds and other administrative divisions here and there. Boundaries of counties still run along the courses of rivers, though these are no longer uninhabited tracts between the populated moorlands. Indeed, now that the people have congregated about bridgeheads, these old boundary lines are a positive nuisance and defeat attempts at good administration in all sorts of ways. Thus is our life sown with heritages from a moorland past.

The moorland life probably lasted on through the Bronze Age and into the Iron Age. Indeed it is probable that, as on the Continent, it was the post-Roman centuries which witnessed the most definite downhill movement, settlement becoming general with the clearing of the forested lowlands.

Invasions in the Bronze Age

Two New Elements

When the knowledge of bronze came to dominate social organization in the eastern Mediterranean, prospectors seem to have scattered about looking for copper and perhaps for gold, and so coastwise trade and movement began in the third millennium before Christ. Evidence is accumulating to show that this eastern Mediterranean was also spasmodically influenced by pressure from the grasslands and consequent crises and movements which must have added to the coastwise changes just mentioned. One of these crises seems to have ended the old kingdom of Egypt and to have continued during the interregnum before the Middle Kingdom was established. According to most chronologists this period of trouble would be about 2500-2200 B. C. Another aspect of the same trouble destroyed Hissarlik II about 2300 B. C. There is thus some evidence of general unrest in the Bronze civilization of the eastern Mediterranean and in the life of eastern Europe generally towards the end of the third millennium before our era. Now, at some time before the introduction of bronze into the west of Europe we get evidence of movement or trade, and then bronze came in, probably by way of western Gaul to Britain, while at much the same time the Beaker people (discussed above in general terms) arrived, apparently without bronze, on the eastern coasts of Britain from Kent probably right up to Caithness sooner or later, though the more northerly immigrants were almost purely Alpine in type.

From the close correspondences between dolmens and other megaliths, dark, broad-headed men and ancient sources of copper and tin, we may say that these men from the eastern Mediterranean were the carriers of the

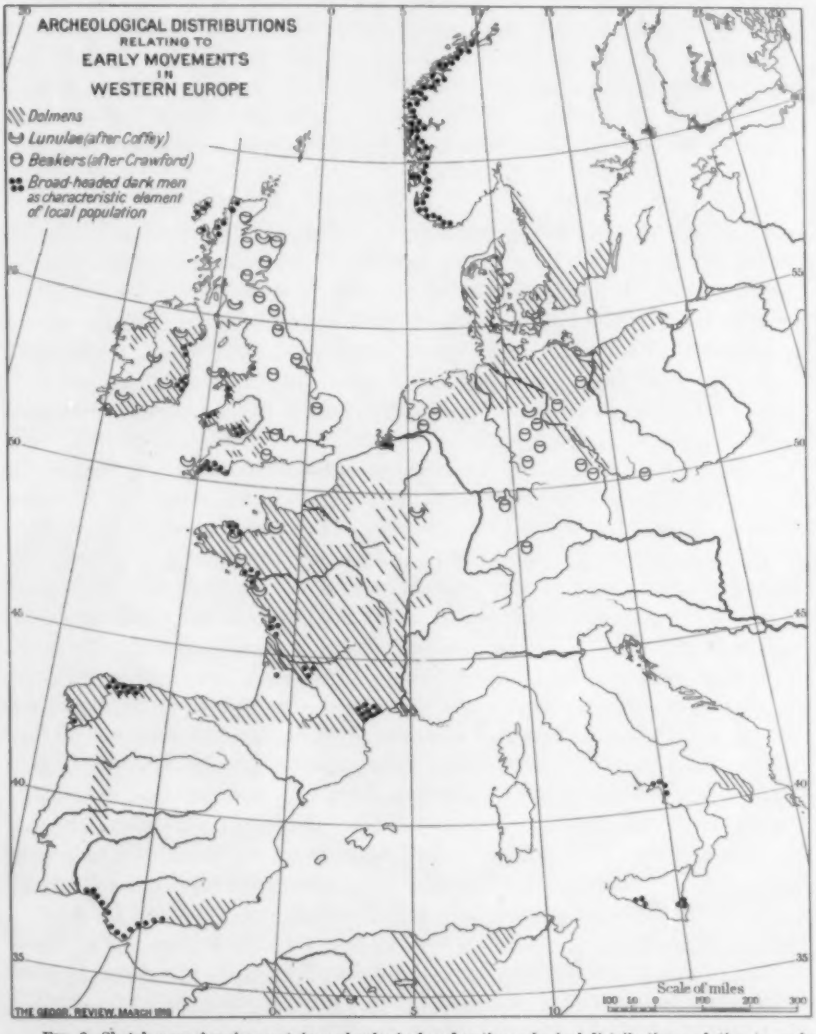

FIG. 2—Sketch map showing certain archeological and anthropological distributions relating to early movements in western Europe. 1:22,500,000. Redrawn, with modifications by the author, from a map facing p. 97 of paper (3), cited in footnote 1.

Bronze civilization, and that they met in Britain the Beaker people who had come across the North Sea from the European plain. The "Beakers" are characteristic of eastern Britain, though they spread west along the

Downs and from the Humber to the Peak at any rate, both lines with opportunities of movement above the lowland forests. Beakers are characteristically absent from Cornwall, where the megalithic, mining, dark, broad-headed life, if these may be associated, was particularly strong.

In this way, two new elements, both broad-headed, were added to the British population. Stalwart dark men spread along western Britain and in Ireland, while the great rough-boned Beaker people, called by most writers until quite recently the Bronze Age invaders, reached the east coast. These invaders were followed by other broad-heads of Alpine type.

Introduction of the Gaelic Languages

From the eastern Mediterranean we know that the periods 1750-1500 B. C. and 1250-1150 B. C. were periods of disturbance spreading from the grasslands in the first case and perhaps from mountain forests in the second, and there can be little doubt that the movements towards Britain continued. The traders' search for metal went on in the interval, and routes from the Euxine and the Adriatic to the Baltic were opened up as well as routes beyond the Pillars of Hercules and northward across western Gaul.

Ireland, with its gold of the Wicklow Mountains, became a goal of the treasure-seekers, and we may think of both Beaker men and dark broad-heads as struggling to reach it. A very few beakers have been found in northwestern Ireland, and the spiral ornament introduced in the Bronze Age from the Baltic occurs at various spots in the northern half of Ireland, while gold ornaments undoubtedly from Ireland occur *inter alia* in north-eastern Scotland. It is thus likely that one way by which Beaker men, perhaps including the legendary Tuatha De Danann, reached Ireland was via northern Scotland during the Bronze Age. Now northern Scotland, the Hebrides, western Scotland, Man, and Ireland are the province of the Gaelic languages, and it is at least possible that they were introduced along this route. This possibility is enhanced when we remember that the Beaker type is also highly characteristic among the Julian gens and other patrician Romans, and that early Italic is looked upon as an offshoot of the root form of the Gaelic languages. In other words we have more than a possibility of a dispersal during the second millennium before our era from the western Russian plain bringing Gaelic to the far west and the beginnings of Latin to Italy. We doubt whether the first Beaker men, those who invaded eastern Britain about 1900 B. C., used Gaelic; more probably a later phase of the movement brought this still surviving element of our life.

Evolution of Languages

One may perhaps be permitted to let the imagination roam a little as regards evolution of languages. Starting from the widely accepted idea that the Aryan family of languages arose on, or perhaps around, the great

steppe, we may suppose that the relatively wide currency of a language in such circumstances would steady it and shear off its eccentricities. Thus it would have an advantage over forest dialects spoken differently perhaps in almost every village. If this be so, then in the period following pressure of grassland folk through the parklands into the forest (such as perhaps the period following 2500-2200 B. C.) there might well be an infiltration of the language of the steppe border gradually supplanting forest dialects on its way. This may help us to understand the Gaelic-Italic spread, with Lithuanian perhaps as evidence of a still earlier spread. If so, we may argue one step further and think of the people of the northern Alpine flank learning this Gaelic-Italic root language and modifying it into the Brythonic-Slavonic root language, becoming Brythonic in the northwest and Slavonic in the northeast.

Ancient Routes Through Britain to Ireland

The Beaker type persists in some numbers among the professional classes in Britain and in the general population of the Tyne Gap and the Cumbrian dales and of Merionethshire, both places most probably connected with old ways to Ireland. The way across from the Northumberland to the Cumberland coast is evident enough, and it is a district influenced by megalithic culture of a sort and possessing also instances of the prehistoric spiral ornament. Merionethshire can never have had much thick forest. Men seeking a way westward from the Humber and the Fens to the Peak could come westward to Chester and the Wirral, or southward and then westward via the Chase country and the Longmynd, and so reach the Welsh Hills. An old paved way, called the Roman Steps, leads through the Rhinog Mountains of Merionethshire, and at its western end we are in a typical west-coast megalithic country, evidently in touch with Ireland, as gold and the spiral both indicate. It may therefore be that this was one route along which the two new elements of British life came into contact.

Dolmens

Of the metal workers and seekers from the south we think it possible to surmise that, while in earlier times they prospected somewhat generally, as time went on they went more and more directly to and from the west, Spanish Galicia, Armorica, Cornwall, Wales, and especially Ireland. These are the dolmen lands *par excellence*, and the various types of monuments need to be studied by survey, with the thought in mind that they may be not so much links in a chronological sequence as works of different groups of men. It seems possible that these monuments are mainly at ports of call along the trade routes or on cross-peninsular ways which shortened sea voyages without introducing too many difficulties of travel on land through forests. The increasing directness of travel to Ireland seems indicated by some elaborate Cyclopean monuments supposed to belong to a late

phase of the Bronze Age. They are not generally distributed but occur on the Spanish coasts and in eastern Ireland (New Grange, e. g.), as also in the Orkneys and Caithness, and, in quite another direction, in southern Russia. They are allied to the Tholos tombs of the Greek mainland. It should, however, be remembered that probably the movements of megalith builders began even before the spread of bronze to the west.

Stone Circles

Another type of monument in Britain has an extraordinary interest; it is the great stone circle exemplified at Avebury, Stonehenge, and in the Hebrides and Orkneys, with lesser circles along the western side of Britain in many places. The complete type occurs elsewhere only in the region between Tripoli and the Gulf of the Syrtis and affords evidence of former links with that far-off country, evidence which is strengthened by the finding of segmented beads of the XVIIIth Egyptian Dynasty in a tumulus in Wiltshire. There is also much evidence in Bronze Age finds of links between western Britain and Armorica. All this more than hints that there is at least a foundation of fact in our British and Irish legendary histories which, like those of the other western nations, claim that some of the British tribes came from the Aegean and included refugees from Troy. The legendary histories, no doubt based on folk tradition, have in all probability fused together a number of distinct movements so that the tangle is a difficult one, but the Tuatha De Danann, the Milesians, the Scots, Brut the Trojan, Lear, Corinius, all probably have some historical foundation. It is one of the tasks of archeologists and anthropologists in years to come to see what can be reconstructed concerning this evidently interesting phase of our country's early history. Coffey and the Irish Museum have given a good lead in this direction by cherishing and studying the fine gold ornaments in which Ireland was then so rich. It is interesting that our legendary histories, especially Geoffrey of Monmouth, who has elements not hitherto found elsewhere, not only speak of these Aegean wanderers, not only tell us in poetic phrase about the Stonehenge monument (type) having come from the "uttermost parts of Africa," not only tell us of the coming of the sword (Excalibur?), but also refer to the conflicts which took place in Britain between these southern folk and certain Huns from Scythia, who might be the Beaker people or people who followed them across the North Sea.

Stonehenge

Stonehenge is near the great road center of early times, and its erection and elaboration, probably about 1700-1300 B. C., show that this center had already begun to have that durable primacy as the place where contributions to British life from east and west met and fought and fused. It may have been so in the Bronze Age; it almost certainly was so in Anglo-Saxon

times, and Arthur and Alfred are linked heroes of the great struggles around this center of tradition and sanctity. The primacy of this district departed as the growth of the wool export trade made the position of East Anglia so important, but the Wiltshire Downs country remained of the greatest consequence until the rise of modern industrialism. It is interesting that this is only one among many examples of primacy of regions where many traditions have met and ultimately fused. The Paris Basin is the classical instance in western Europe, but the Aegean itself is another case in point, and all illustrate the importance of the mingling of peoples as against the notion of the super-race protected from contamination. It seems certain that during the Bronze Age a number of immigrations and invasions of Britain occurred and, quite probably, Britain felt once more a double pressure in the general convulsions round about 1200-1100 B. C. It is probable that some of the migrants mentioned in Irish and other legendary history were refugees from old Mycenaean communities of that time, destroyed by the coming of the leaf-shaped sword people. These latter spreading out, Peake thinks, from the too wet forests of the mountains of central Europe, reached Scandinavia and Britain as well as the Aegean, and probably the clash was felt in Britain, as elsewhere. The legendary histories, at any rate, are full of evidences of war and all forms of trouble between southwestern England and the country from the Humber to Caithness, i. e. between the country in first contact with the coastwise route from the Mediterranean and the country in first contact with Scandinavia and the Low Countries.

We should probably imagine a succession of immigrants, traders, and invaders coming to Britain in the Bronze Age from both directions—from the Mediterranean basin and from the European plain. The amount of intercourse may have been quite considerable, and there may have been practically a circular route around Europe, for the European plain came into relations with the Mediterranean across what has since become Russia and Poland.

Iron Age Movements

The Belgae

There is some evidence to show that the last part of the Bronze Age witnessed a good deal of forest cutting, and with the advent of iron in eastern and southeastern Britain (about 450 B. C. perhaps) the country seems to have entered into relation with eastern and northeastern Gaul, say with the later Burgundy. It is quite possible that the first introduction of iron did not mean an invasion, but that the great inroad took place much later and was the coming of the Belgae to southern England. Whether the Brythonic-Celtic language came with the Belgae, or with iron, or before, we cannot say but we suspect that it is not very much older than the Belgae, and they came from near the region which may possibly have been responsible for early stages of its differentiation. Probably the Belgae

were men of strong build with fair hair and rather broad heads. The type would not be very unlike that of the Anglo-Saxons of centuries later, and we thus have a difficulty in deciding what is "Briton" and what "Anglo-Saxon" in the population of eastern Britain.

It is probable that the west resisted these Brythonic or Belgic invaders whether it was already partly Brythonized or not. The Bronze Age civilization seems to have lived on for a long time in western Britain and in Ireland, and the clash between that older life on the moorlands and the iron-using people, apparently beginning to live in the valleys, is an abundant source of realistic Welsh folk tale. The evidences also of the finds of the earliest Iron Age (e. g. at Hengistbury and Glastonbury) are all for connections at that time with southwestern France and Armorica, not with northeastern Gaul. The contrasts in civilization between these western sites and such more easterly ones as Silchester and Aylesford seems very marked.

It is well to remember that the Brythonic or Belgic period was one of artistic achievement, as witnessed by the ornamental shields and many other objects exhibited in the British Museum. The Britons were no mere wild men of the woods.

The Romans

Now the Romans enter upon the scene, and the taming of the lowlands is pushed forward by road building and the founding of cities. But though the English plain entered upon a period of city life and Roman culture, the far west, when touched, seems to have remained in a state of military occupation, while Ireland was not touched at all. Hereby came into being some of the distinctions which were going to set the different components of the British population apart for future ages.

The English plain began to learn Roman speech and Roman ways, and its older language became merely a dialect of kitchens and farmyards. The west had received, no doubt, an influx of the more warlike spirits from farther east and had had abundant cause to maintain its speech with pride, as a mark of its fidelity to its origins. At the same time, the language would be modified and much enriched by contact and exchange with the Roman soldiers and officials at the markets outside the camps, as well as along the lines of communication in Wales. Ireland was not touched by the Romans.

The Anglo-Saxons

Before the Romans left, the population of the plains had been weakened, it is said, by the slaughter of many young men who followed the adventure of Maxen Wledig. When they did depart, and the Anglo-Saxons and other Germanic-tongued peoples arrived on the scene, the wonder is, not that they met with so little resistance, but that they met with so much. Gomme upholds the view that the invaders left London aside as beyond their

strength, and that theory, while far from established, at least avoids the old difficulty of understanding how London could have been an empty ruin for years and how it could have come about that London has such a characteristic and almost Roman tradition of its own. Behind London, the old stocks seem to have held out in the Chiltern Hundreds, and the memory of their special position persists in parliamentary procedure to this day. Their inhabitants still include a large number of the Mediterranean stock, and it is claimed that they have been distinct in many other respects, a district near by not needing Enclosure Acts of the eighteenth century because it did not then possess agricultural villages with communal cultivation. We shall perhaps not be far wrong if we tentatively connect such villages especially with the Belgic and Anglo-Saxon immigrants from the forest clearings of northwestern Europe.

The Anglo-Saxons spread their dominion along many river valleys and taught their language to the conquered folk, a de-Celticized peasantry whose leaders were dead or had fled. Of the coming of Dane and Norseman it is unnecessary to speak, save that one may point out the opposition of moorland and estuary. The British kingdom on the Pennine slopes and the Northumbrian Deira in the estuarine section of the Ouse, up to York or thereabouts, maintained a long struggle. There were also other cases of maintenance of the two traditions side by side. There is evidence that the British held the plain of Avebury for a century or more after Saxons had held the Vale of Pewsey.

The Welsh People

The far west, namely Wales and Damnonia, was long free from land invaders in any force, but it was open to sea rovers, just as was eastern Ireland. They found strong footholds here and there, as in Pembrokeshire and on the Liffey, but in several estuaries of Wales they seem to have had scant opportunity, and though one finds people who would seem to be their descendants along the coast, these people have become fused into the Welsh population. The old language, invigorated probably by its brusque contact with Latin, has persisted, and a tradition has grown up around it and around the generally successful resistance to the Anglo-Saxon tradition. The result is that descendants of Stone Age inhabitants of valleys off the moorlands, broad-headed folk who may be related to the ancient beaker-makers, and others who are probably coastal wanderers of the Bronze Age, besides sea rovers, and probably Flemish artisans, not to mention Huguenot weavers, have more or less fused into a Welsh people, proud of its language and of its tradition, much older in part than the language.

Southern Britons

A mixture of much the same elements, save the coastal wanderers of the Bronze Age who occur only in the west so far as is known, learned the

Teutonic speech of the post-Roman invaders of the English plain. Later on it absorbed its Norman conquerors and with them a large dose of Franco-Norman civilization and it developed a tradition around its partly Teutonic language. It was much altered by Roman influence and its people largely molded by Gallic civilization, but this much-mixed tradition is that which binds the English people together.

Persistence of Ancient Types

In both groups the Mediterranean or, at any rate, the ancient long-headed stock or stocks are the broad foundation; in Wales, at any rate, they make their large contribution to the churches, to the poet's art, and to medicine; while in England, where disastrous events have destroyed the germs of peasant culture, they seem to become too largely the people of the slums. The type of the southern Bronze Age wanderers persists among western fisher-farmers, among the real fishing population, and thence emerges among ship owners, business organizers, and in the country's leaders. The type of the John Bull yeoman was a thickset variety of the Beaker people; with the decay of rural life and the growth of industrialism he has become rather rare, but traces of the Beaker people's type are widespread among the professional classes and the intellectual leaders. The Nordic type is an important constituent of the landed aristocracy and cannot live long under poor conditions in large towns. Its mighty influence seems to have contributed much to the prevalence of the country house and hunting life of rural England and thus to the retrogression of cultivation, which is such a serious fact at present. Yet with all this it is also a potent influence towards new ideas and new ventures; it is prominent in new "causes" and in the backwoods of the new lands. Indeed, with the progressive industrialization of Britain it was streaming away to the Far West and the Far South year after year. How to maintain it as a valuable factor of the nation's life, without at the same time exterminating the John Bull type or making life a burden for the still older elements of the people, is the anthropological setting of the internal polity of the English plain.

The Celtic Tradition

How to maintain in mutual respect the two main traditions above sketched out, the English and the Welsh, is another problem prominent enough till the war began. That the Welsh tradition is poorer for its necessary stress on resistance is but too true. When the English tradition is ignorant in its contempt of the Welsh one, that is less excusable. The study of anthropology and of antiquities emphasizes the continuity of British tradition throughout, in spite of Normans, Anglo-Saxons, Romans, Brythons, and what not. It suggests that instead of looking upon the Celtic tradition as the poor keepsake of a conquered people, all but exterminated by the

Anglo-Saxon conquerors, we might with more truth look upon it as an heirloom, a precious ancient phase of our own tradition, to lose which would be to impoverish the British peoples forever. It does often happen that when a family acquires new and great wealth it is apt to cast out the furniture and the china it formerly used, in order to lay in a new stock at a fashionable shop. But it not infrequently happens, too, that as leisure brings refinement and artistic appreciation, the banished china is found to be precious Swansea ware, or the old armchair is Chippendale, and so the old possessions come into new honor. May it be so with the British tradition, as soon as the fever of industrialism and of its attendant wars has subsided.

GEOGRAPHICAL RECORD

AMERICAN GEOGRAPHICAL SOCIETY

Intermonthly Meeting of February. An intermonthly meeting of the American Geographical Society was held on Tuesday evening, February 12, at the Engineering Society's Building, 29 West Thirty-ninth Street. President Greenough presided. The lecture for the evening was entitled "Fighting Above the Clouds" by Professor Charles Upson Clark, Director of the School of Classical Studies of the American Academy at Rome. The lecture dealt with Italy's part in the war and was illustrated by lantern views and by motion pictures of the fighting in northern Italy.

NORTH AMERICA

Seattle, the Fourth Port of the United States. During 1917, according to the *Industrial News Survey* (published by the National Industrial Conference Board, Boston) for the week of December 31, 1917, to January 7, 1918, Seattle passed San Francisco in the value of her foreign trade, which amounted to $600,000,000, thereby taking rank as the fourth port of the United States. This marked advance is due, of course, to the present abnormal conditions. War has revolutionized shipping routes. Supplies for the Russian armies constituted a large part of Seattle's exports (Abraham Berglund: The War and Trans-Pacific Shipping, *Amer. Econ. Rev.*, Sept. 1917). But her admirable geographical situation fits Seattle to maintain the position she has reached. Located at the most advantageous point in an extensive network of waterways, with sufficient depth of harbor and convenient dockage, within easy reach of a productive district, a position of local prominence was early assured her. Lumber and fish constituted the first important trade. Forest products were in demand along the entire west coast of North and South America. The cities on the treeless Peruvian and Chilean coasts and even far interior towns of the Andes called for the pine of Washington's forests. Railroads, when they came, made the entire Northwest a hinterland for Seattle, while no point was so well situated as a gateway to the gold and fur-bearing regions of Alaska. When commerce with the Far East was opened up Seattle was ready to offer the shortest route by which wheat and manufactured articles from the northern United States could be exchanged for the products of the Orient (see W. M. Gregory: The Growth of the Cities of Washington, *Journ. of Geogr.*, May, 1916). The heavy war shipments to Asiatic Russia have now made her America's foremost Pacific port.

The Labrador Eskimos. Of the widely distributed Eskimo race only the Central and North Greenland tribes still retain their indigenous culture unaffected or but slightly affected by contact with a higher civilization (see Diamond Jenness: The Copper [or Central] Eskimos, *Geogr. Rev.*, August, 1917). Westward the Alaskan Eskimo has greatly modified his mode of life during the last thirty-five years (*idem:* The Eskimos of Northern Alaska, *Geogr. Rev.*, February, 1918); on the eastern side of the continent, in South Greenland and Labrador, contact between the white man and the Eskimo is of comparatively ancient date. Some of its consequences for the latter group are presented by E. W. Hawkes in a memoir entitled "The Labrador Eskimo" (*Geol. Surv. of Canada Memoir 91: Anthropol. Series No. 14*, Ottawa, 1916).

Today the Labrador Eskimo is found on the Atlantic seaboard from Hamilton Inlet northward, in groups about the trading posts and scattered along the shores of Ungava Bay, and dispersed along the desolate eastern shores of Hudson Bay. Practically all the Eskimos on the Atlantic coast of the peninsula are gathered into the six Moravian missions and are directly under mission control. To this circumstance they largely owe their existence, for in eastern Labrador the Eskimo has felt the rude contact with white civilization more keenly than elsewhere. When the French arrived in the Gulf of St. Lawrence they found the Eskimo ranging as far west of Mingan (64° W.). Between the newcomers, aided by the Montagnais Indians, whom they supplied with guns, and the Eskimos strife was constant and the Eskimos were forced to retreat. The same policy was maintained by the British until the wise Palliser, governor of Newfoundland in the latter half of the eighteenth century, adopted a conciliatory attitude towards them. When the Moravian Mission began work on the coast at this same period the Eskimos were estimated at 3,000. As they disappeared from the south—today with the exception

of a few individuals in Sandwich Bay there is no pure-blood Eskimo south of Hamilton Inlet—the numbers at the missions increased. The mission stations, it should be remarked, were wisely placed in the best hunting grounds. By 1840 there were 1,034 Eskimos at the four stations. Since that date the numbers have not varied greatly; they have fluctuated with epidemic and famine, but the general level has been maintained; in 1913 it was about 1,250.

The missions have protected the native from the exploiting white and they have encouraged him to continue to live in native fashion as regards food, clothing, etc. But change in religious and social ideas renders inevitable some change in material culture. The fundamental occupations remain the same; the details of their operation have been modified. The whale-boat has replaced the umiak; the bow and arrow has been superseded by the rifle; cod fishing has taken the place of salmon in native economy; the art of building snow houses is entirely forgotten south of Hopedale and is only retained in the north by judicious fostering; canvas has replaced skins for tents. Today the culture of eastern Labrador is hybrid; it is an Eskimo culture adapted to white ideas. To find a typical Eskimo group one must go into Hudson Strait or Bay.

The Unexplored Areas of Continental Canada. Synopses of our present state of knowledge of the topography of a given portion of the earth's surface are always valuable because they show at a glance, especially if represented on a map, what has been done and what remains to be done. A recent admirable example is Frank Cana's map of Africa, 1:20,000,000 (*Geogr. Journ.*, Vol. 38, 1911), which indicates the state of exploration of that continent in five grades of completeness. A similar inquiry with regard to Canada has recently been undertaken by Charles Camsell of the Canadian Geological Survey (The Unexplored Areas of Continental Canada, *Geogr. Journ.*, Vol. 48, 1916, pp. 249-257). The investigation is wisely restricted to continental Canada inasmuch as insular Arctic Canada, as Stefansson's recent discoveries show (see below), is not entirely revealed as yet and even the coasts of long-known islands are not laid down accurately or are totally undetermined (for example, Southampton Island, see *Bull. Amer. Geogr. Soc.*, Vol. 42, 1910, map facing p. 84, and Vol. 45, 1913, map on p. 576; and Baffin Island, for most of the west coast of which we are still dependent on the Eskimo maps published in the narrative of Hall's second expedition). To determine the unknown areas Mr. Camsell assumes a strip 15 miles wide on each side of an explored route to be known. The areas remaining between the resulting 30-mile bands representing the network of explored routes constitute the unknown areas. The author does not mean to imply that these areas have never been visited; but the travelers who entered or crossed them made "no reasonably accurate surveys" or left "no records of the geography, life, or general character of the region traversed." No area of less than 4,000 square miles is included. The areas were, according to a communication from Mr. Camsell to this Society, originally plotted and measured planimetrically on the standard base map of Canada, 1:2,217,600, published by the Department of the Interior, Ottawa. A reduction was then made and sent with the article. The map was, however, not published in the *Geographical Journal*. Subsequently Mr. Camsell on request kindly furnished this Society with an approximate copy on the base map of Canada in 1:6,336,000, and from this the accompanying map (Fig. 2) was made. These details are entered into in order to afford a criterion as to the method followed.

Mr. Camsell's paper naturally calls to mind a similar inquiry made twenty-six years before by the late Dr. George M. Dawson, Director of the Geological Survey of Canada (On Some of the Larger Unexplored Regions of Canada, *Ottawa Naturalist*, May, 1890, 12 pp., with map in 1:27,000,000; reprinted, with map, as Appendix 1, pp. 277-289, of Warburton Pike's "The Barren Ground of Northern Canada," London, 1892). In this the known strip of territory on each side of the traveled routes was taken to be 25 miles wide. "All ..... traveled routes along which reasonably satisfactory explorations have (had) been made and of which fairly accurate route-maps are (were) in existence" were taken into consideration. The smallest area outlined is 7,500 square miles in extent. A comparison of the two synopses is of interest. Dawson's map is reproduced herewith (Fig. 1) on the same scale and base as Camsell's. It should be remarked that Dawson's published map is on a small scale and poorly engraved, the underlying base being quite inaccurate in geometrical outline. However, the original plotting and computation were evidently made on a large-scale map, which was displayed by the author at the lecture of which the paper is the printed form. In view of Dr. Dawson's well-known accuracy, no doubt need therefore be entertained as to the correctness of the figures which he gives for the unexplored areas. His areas, and Mr. Camsell's, are here as far as possible correlated in tabular form. The numbers of the various blocks are those assigned them in the original papers and correspond with the numbers on Figures 1 and 2. Equivalent areas are listed as far as possible opposite each other.

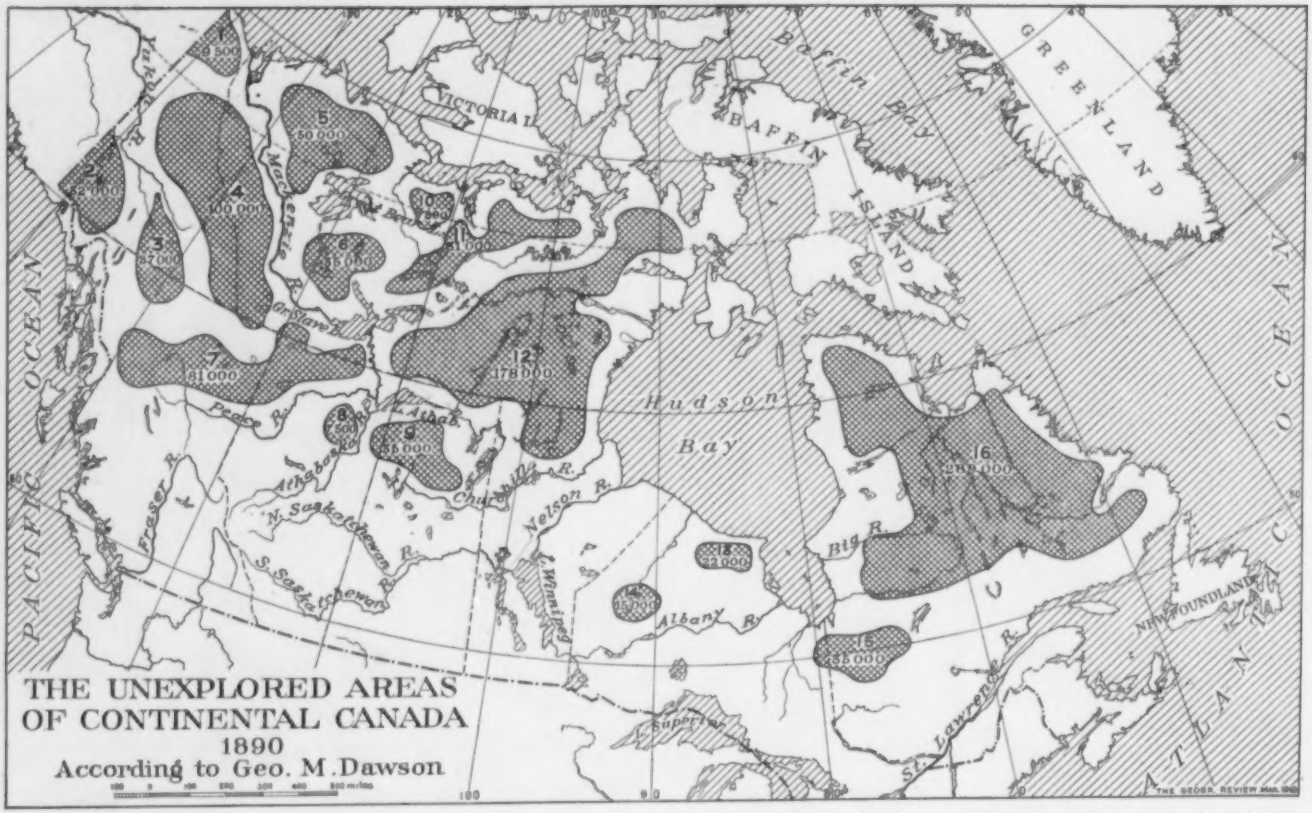

FIG. 1—The unexplored areas of continental Canada in 1890, according to G. M. Dawson. Scale, 1:30,000,000. (Copied from the author's map in the May, 1890, *Ottawa Naturalist*.)

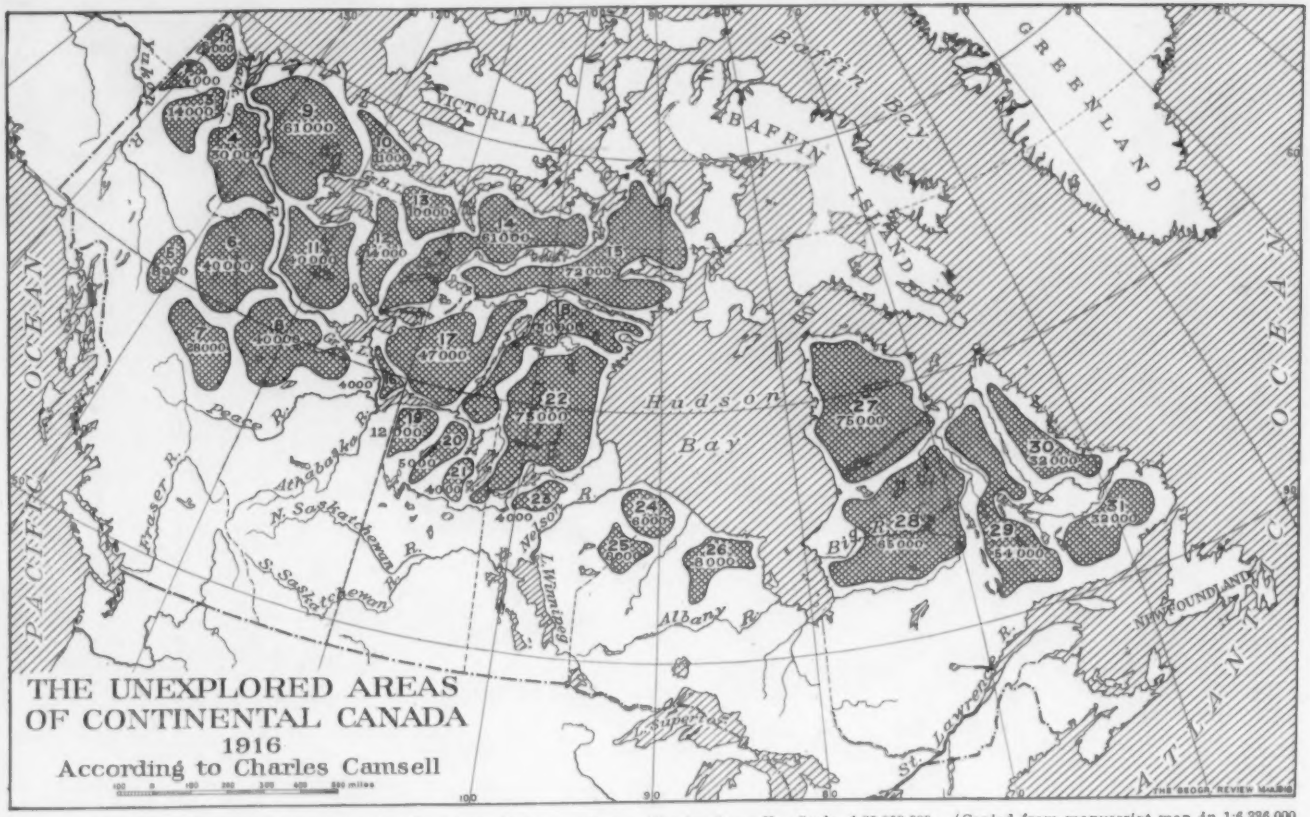

FIG. 2—The unexplored areas of continental Canada in 1916, according to Charles Camsell. Scale, 1:30,000,000. (Copied from manuscript map in 1:6,336,000 furnished the Society by Mr. Camsell.)

UNEXPLORED AREAS OF CONTINENTAL CANADA

Dawson, 1890			*Camsell, 1916*		
	AREA	SQ. MILES		AREA	SQ. MILES
1	N of Porcupine R.	9,500	1	N of Porcupine R.	8,000
			2	W of Porcupine R.	4,000
2	SW of Lewes and Yukon Rs.	32,000			
3	Between Lewes, Pelly, and Stikine Rs.	27,000	5	W of Dease and Francis Rs.	8,000
4	Between Pelly and Mackenzie Rs.	100,000	3	W of Peel R.	14,000
			4	E of Peel R.	30,000
			6	N of Liard R.	40,000
7	Between Stikine-Liard and Skeena-Peace Rs.	81,000	7	W of Ft. Nelson R.	28,000
			8	N of Peach R.	40,000
5	NW of Great Bear L.	50,000	9	NW of Great Bear L.	61,000
			10	N of Great Bear L.	11,000
6	S of Great Bear L.	35,000	11	S of Great Bear L.	40,000
8	Between lower Peace and Athabaska Rs.	7,500			
			12	W of Coppermine R.	14,000
10	NE of Coppermine R.	7,500	13	NE of Coppermine R.	10,000
11	N of Great Slave L. and Back's R.	31,000	14	N of Great Slave L. and Back's R.	61,000
			15	S and E of Back's R.	72,000
			17	N of L. Athabaska	47,000
12	Between Back's R. and Hudson Bay	178,000	16	E of Slave R.	4,000
			18	E of Dubawnt R.	30,000
			22	E of Kazan R.	73,000
9	SE of L. Athabaska	35,000	19	S of L. Athabaska	12,000
			20	E of Cree R.	5,000
			21	W of Reindeer L.	4,000
			23	S of Churchill R.	4,000
			24	SE of York Factory	6,000
			25	NE of Island L.	8,000
13	NW of Attawapiskat R.	22,000	26	SE of Winisk R.	8,000
14	Headwaters of Severn R.	15,000			
15	SE of James Bay	35,000			
			27	W of Ungava Bay	75,000
			28	N of Eastmain R.	65,000
16	Interior of Labrador	289,000	29	E and S of Kaniapiskaw R.	54,000
			30	E of George R.	32,000
			31	S of Hamilton R.	32,000
	Total, in round numbers,	950,000		Total, in round numbers,	900,000

A glance at the two totals as well as at the maps shows that, apparently, after a lapse of a quarter-century the unexplored area is hardly less than it was before. This is of course due to Dr. Dawson's assuming a wider strip as known than Mr. Camsell. A measurement of the perimeters of Mr. Camsell's areas on his map in 1:6,336,000 has shown that this factor accounts for 250,000 square miles. The comparable totals are therefore, Dawson, 950,000; Camsell, 650,000—which better expresses the progress of exploration in the intervening time. The main inroads that have been made into the unknown areas of 1890 relate to the upper Yukon region, where the development of the Klondike gold fields has brought scientific exploration in its train, and to Labrador and the block between Great Slave Lake-Back's River and Hudson Bay, both of which have since been crossgrained by route surveys.

The present unexplored areas belong, according to Mr. Camsell, to three types of country. By far the largest portion—two-thirds—lies in the Laurentian Plateau, that vast area of ancient rocks that extends in U-shape around Hudson Bay from the Atlantic coast of Labrador to the line of great lakes consisting of Winnipeg, Athabaska, Great Slave, and Great Bear—Suess's "Canadian Shield." Its rocky, lake-studded surface makes it unsuited to agriculture, even where climatic conditions are not prohibitive, as they are in the north, where the coniferous forest gives way to the open Barren Grounds —the American tundra. Mineral resources are the main asset of this region. The

second type of country is represented by the great central plains of the continent, which here, in their northern section, narrow down from a width of 1,000 miles in the latitude of Winnipeg to some 200 miles across the middle Mackenzie. About 110,000 square miles of the unexplored regions on both sides of the Mackenzie are of this type. This includes the areas in Figure 2 numbered 8 and 11 and parts of 4 and 9. Some of this area is probably suited to agriculture, especially the block lying north of the Peace River and west of Great Slave Lake. The third type is that of the Cordillera. This includes the blocks lying west of the Fort Nelson, Liard, and Mackenzie Rivers numbered 1, 2, 3, 5, 6, 7, and the greater part of 4 and covers some 130,000 square miles. The chief value of this area probably lies in its mineral resources, although, because of the disturbances incident on mountain structure, it is less easy to forecast its geology than it is that of the Laurentian Plateau.

SOUTH AMERICA

Settlement of the Amazon Basin Through Reformed Methods of Rubber Gathering. According to a statement in an article on "Brazil's Expansion of Manufacturing" in the January, 1918, number of *The Americas* (published by the National City Bank of New York) the Amazon states of Brazil are attempting to reform the prevailing system of gathering rubber. At present a company sends its expeditions up along a stream carrying all their supplies with them. The rubber on each side of the rivers is exploited, but for only a short distance from shore. Nothing but temporary quarters need be erected, except at river junctions or other strategic points. The reform aims to establish permanent colonies where land would be cleared and provisions raised. Such a plan should make it possible to smoke rubber under better conditions and so improve the quality of the Pará shipments. If the scheme were carried out successfully roads and railroads would soon be required. This would result in the opening up and extensive development of that vast interior country upon which civilization has secured so feeble a hold. In the four centuries during which Europeans have repeatedly penetrated the remote regions of the Amazon Basin, they have succeeded in establishing only attenuated lines of riparian settlements, while the wide interfluvial areas have remained undeveloped. The reform being attempted is one of various projects by which Brazil hopes to obtain permanent settlements in her interior provinces.

Cheese Production, A New Industry in Argentina. Though the people of Argentina own nearly 30,000,000 head of cattle (about four per capita) and use thousands of square miles for pasture lands, there has been very little dairy business in the country until recent years. Except in the cities milk and butter were almost unknown. European countries supplied the foreign residents with condensed milk and tinned butter, while cheese came from the same source, in largest quantities from Italy. The Argentine herds were used almost solely for their meat, hides, and bones and for the supply of draft oxen. According to the *Revista de Economía y Finanzas* of Buenos Aires for November 5, 1917 (p. 16), this condition has suddenly changed, especially as regards the production of cheese. The native factories produced 7,800,000 kilograms more in 1917 than in 1913. Last year the balance swung from large importations to considerable exportations. While in 1916 there were 1,421,246 kilograms of cheese imported and only 227,711 kilograms exported, in the first half of the past year 1,399,101 kilograms were exported and but 249,432 kilograms imported. This situation has been brought about partly by the abnormal trade conditions created by the war. Europe has been unable to supply the foreign markets with dairy products. According to *Commerce Reports* for November 26, 1917 (p. 772) European countries sent just 99 pounds of cheese to the United States in August last as against a monthly average in 1914 of about 5,300,000 pounds. The United States is now exporting this commodity to fifty foreign countries. Argentine cheese producers, already supplying the demands of their domestic market, are taking advantage of this revolution in trade conditions and are replacing some of the European exporters. In August, as shown by the report mentioned, 448,000 pounds of Argentine cheese came into the United States. The year before not a single pound had come.

The climate of Argentina is not well suited, in some respects, to the dairy business. The supply of natural pasturage is made uncertain by recurring periods of severe drought, such as that of 1916. The rainfall on the pampas is so light that grasses are usually hard and coarse. There are sudden extreme fluctuations of temperature and humidity. But in spite of these disadvantages the more intensive development of the great *estancias*, introduction of the best foreign breeds of cattle, denser settlement of rural districts, great improvement in transportation, and the demands of domestic and foreign markets have made possible the rapid growth of the industry. Aside from its commercial aspect

this is significant in that it marks the passing of the primitive nomadic pastoral life of gaucho days and the advent of a settled population with its characteristic industries.

EUROPE

The Climate of the Western War Zone. The importance of meteorological controls over military operations has naturally stimulated interest in the climate and weather of the various war zones. The interest in the climate of Belgium and of eastern France has been greatly intensified since the advent of American troops in Europe. Questions concerning the cold and the heat, the snow and the rain on the western front are more and more frequently asked. In order to answer such inquiries, Mr. P. C. Day of the U. S. Weather Bureau has prepared some "Notes on the Climate of France and Belgium" (*Monthly Weather Rev.*, October, 1917). Special emphasis is laid upon comparisons between conditions abroad and those in the United States. Temperature and precipitation curves and charts are given for selected stations in France, Belgium, and the United States, and numerous tables carry the comparisons farther. The essential climatic facts for the western war zone are the relatively warm winters, considering the high latitude; the relatively cool summers; and the moderate annual amount of precipitation, with frequent rainfalls. The coldest weather on record in northern France ranges from about 0° F. to —10° F., but there is no such intense cold as is characteristic of the interior and northern portions of the United States. Again, in summer, the mean temperatures (July and August) are only 63° to 65°, and in most of northern France and in Belgium single temperature readings of 100° have never been reported.

The rainfall on the lowlands is between 20 and 30 inches. In the Vosges it reaches 60-70 inches. A fairly even distribution through the year is the general characteristic, with a not very well defined maximum in fall and early winter. Snow may be expected from November to April, fairly frequently, but does not often attain any considerable depth. In the mountains the snowfall is much heavier. At Brussels, snow occurs on about 25 days a year; at Paris, on about 15 days.

A brief description of the climate and weather of this same area, with special reference to military operations, may be found in a recent article by the undersigned, entitled "The Weather and the War" (*Journ. Milit. Service Instn.*, Vol. 61, Sept.-Oct., 1917, pp. 145-155). R. DEC. WARD

AUSTRALASIA AND OCEANIA

Drought in the Gilbert Islands. Serious drought has prevailed in the Gilbert Islands during the past year (*United Empire*, Vol. 8, N. S., 1917, p. 548). The islands (whose annexation by Great Britain in 1915 was noted in the Feb., 1916, *Review*, p. 145), lying in the mid-Pacific athwart the equator, normally enjoy a good rainfall, but the recurrent periods of drought are a bar to their economic development. Drought kills the coconut tree and cuts down the export of copra, the chief item of the insular trade. Continued drought has had even more serious consequences, the inhabitants being at times put to straits to procure sufficient water to support life. To meet emergencies the local government has lately completed on Ocean Island a system of cement cisterns, whose speedy construction, expedited as a result of native forecasts, now assures the supply of the government staff. The natives also have been encouraged to spend upon tanks a part of the money derived from the sale of their lands to the Pacific Phosphate Company. The company, however, has secured them against entire destitution by the erection of a condensing plant where water may be bought in case of drought (Gilbert and Ellice Islands Protectorate: Report for 1914-1915, *Colonial Repts. No. 884*, London, 1916).

An Extraordinary Rainfall Record from the Hawaiian Islands. Cherrapunji, Assam, enjoys world fame for its extraordinary rainfall, averaging 460 inches per annum. In *Science* for November 23, 1917, Douglas H. Campbell calls attention to a rival nearer home (An Extraordinary Rainfall Record, pp. 511-512). Kauai, most northerly of the Hawaiian Islands, boasts a station whose average rainfall for the last five years (1912-1916) is 500 inches. This station is on the summit of Mt. Waialeale, 5,705 feet above sea level. Precipitation is almost constant, and the surface of the region is entirely bog, either open or supporting a growth of low moss-covered trees.

POLAR REGIONS

Discovery of New Islands in the Arctic Archipelago by Stefansson. Two despatches from Stefansson received at the end of last year (from Melville Island, February 17, 1917, and Herschel Island, November 10, 1917, *New York Times*, December 29

and 28, 1917, respectively) tell of important new discoveries that the explorer has made since he was heard from last. These continue the report of his activities from May, 1916, when he stood on the threshold of the new land discovered in June, 1915 (see *Bull. Amer. Geogr. Soc.*, Vol. 47, 1915, pp. 766-769, and *Geogr. Rev.*, Vol. 2, 1916, pp. 470-471). Proceeding along its western coast he found its northern tip, which he named Cape Malloch, to lie in about 79° N. and 113° W. (see map, Fig. 1). On a later stage of his journey the other corners of this land, which proved to be an island, were located and named as follows: northeastern tip, Cape Mamen, approximately 78° 30′ N. and 108° W.; southeastern tip, Cape Mackay, 77° 50′ N. and 110° W.; southern tip, Cape Beuchat, approximately 77° 15′ N. and 113° W.; southwestern tip, Cape Murray, 77° 55′ N. and 114° 30′ W. This places the new island between Prince Patrick and Ellef Ringnes Islands. The names were evidently given in honor of men of the expedition who lost their lives when trying to reach land after the *Karluk* sank in January, 1914. Continuing in a northeastern direction, presumably past Cape Isachsen of Ellef Ringnes Island, a second new island was discovered on June 13, 1916. The location of its three salient corners, southwestern, northern, and southeastern, are given as 79° 50′ N. and 102° W.; 80° 12′ N. and 100° W.; 79° 40′ N. and 99° W. It therefore lies between Ellef Ringnes and Axel Heiberg Islands. Stefansson also reports the existence of several smaller islands between the second new island and Axel Heiberg Island.

Turning southward from here the explorer's route presumably lay through Hassel Sound, the strait separating Ellef Ringnes from Amund Ringnes Island. Hassel Sound he found to be 15 miles wide at its narrowest part: it is shown as about 5 miles wide on the general map accompanying Sverdrup's account of his expedition of 1898-1902 (''New Land,'' 2 vols., London, 1904), but this representation was intended to be provisional only, as no member of the expedition had traversed it. Continuing, Stefansson entered an area lying on the border of the fields of work of previous expeditions. Such areas are always likely to be inaccurately represented, and Stefansson evidently did not find it otherwise. On April 29, 1853, Sherard Osborn of the Franklin Search expedition of that year, sighted what seemed an extensive land 30 miles or more to the northwest of the northwestern extremity of Bathurst Island. On the maps this figures as ''Finlay Land,'' lying in about 77° N. and 105° W. On April 27, 1901, Isachsen of the Sverdrup expedition and his party saw from the southern extremity of Ellef Ringnes Island a land to the west that extended southward ''as far as the eye could reach.'' They named it King Christian Land and placed it in about 77¾° N. and 102° W. on their map, joining it in hypothetical outline with Finlay Land, thus creating an island some 80 miles long from northeast to southwest and 45 miles wide. This island Stefansson's explorations have now again broken up into its constituent parts. He reports the most southerly point of King Christian Island to lie in 77° 41′ N. and the greatest east-and-west diameter of the island to be 15 miles. The greatest diameter of Finlay Island he says is about 12 miles, and the maximum depth of the sea between the two islands 172 fathoms. The existence of a small island between Paterson Island (76° 50′ N. and 104° 15′ W.) and Finlay Island is also reported.

Proceeding to the west a third new island was discovered on August 3. Its northern tip lies in approximately 77° 55′ N. and 108° 10′ W.; its southern tip in 77° 9′ N. and 107° W. This island therefore lies southeast of the first new island. A month was spent on it, to September 9. The east coast of the first new island was then visited and followed southward and westward around Capes Mackay and Beuchat until Cape Murray was reached on September 23. From here the route probably skirted the northeastern end of Prince Patrick Island and the northern shore of Melville Island until Liddon Gulf was reached on October 16. Stefansson's later movements can only be conjectured. In his second despatch he speaks of an advance made over the sea ice from the northern coast of the first new island, in the spring of 1917. He proceeded from 78° 30′ N. and 110° W. and reached a point 140 miles north-northwest of this. Between these two points the sea bottom ''showed no gradual or other slope away from the land. The depth varied from 444 to 570 meters. There was strong ice pressure but little ice motion as compared with the sea either west of Banks Island or north of Greenland.''

Stefansson next speaks of being at Barter Island (off the Alaska coast, 144° W.) on September 13, 1917. During a westerly gale his vessel went aground and was not refloated until September 27. This date the explorer considered too late for an attempt to get around Point Barrow and thus out of the Arctic seas, so he evidently turned east to winter at Herschel Island, whence the despatch dated November 10 was sent. A recent despatch to the *Toronto Globe* (reprinted in the *New York Times* of March 1) showed him still there on January 31 of this year, planning a sledge expedition over the sea ice north from Cross Island, Alaska (148° W.), and counting on being carried by the westward current to Wrangell Island on the Siberian coast.

The importance of Stefansson's latest work is patent. It has done much toward

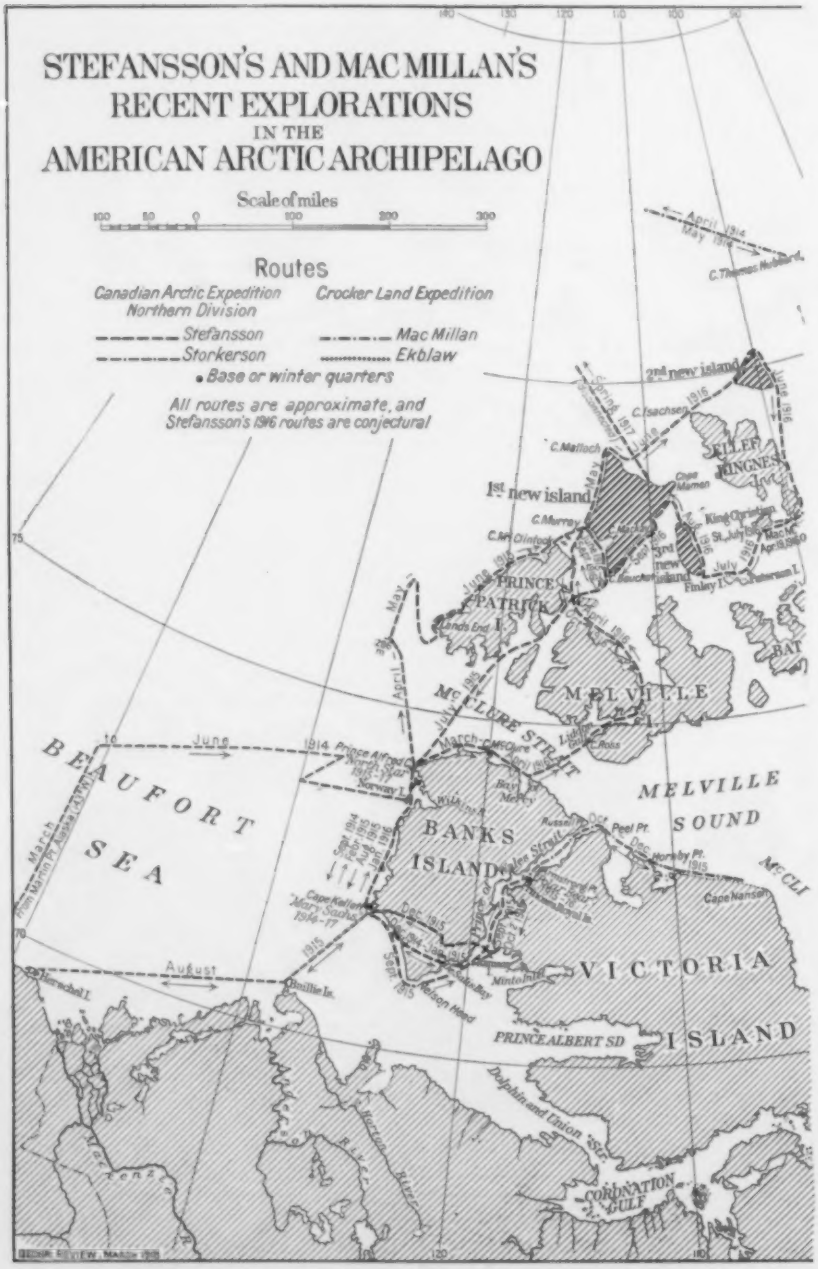

FIG. 1—Sketch map showing Stefansson's and MacMillan's routes in the American Arctic Archipelago, 1914-17. Scale, 1:7,400,000. Stefansson's 1914 and 1915 routes are based on a map in *Rept. Dept. of the Naval Service for Year Ending March 31, 1916*, Ottawa, 1916, p. 79; later routes or the newspaper despatches mentioned in the text. MacMillan's routes are based on various reports, including Lieutenant Green's, abstracted in the next item.

FIG. 1A—Eastern continuation of Fig. 1.

clearing up the question whether the unknown area north of Alaska harbors a land complex or is part of the Polar Basin. His advance northwestward from the first new island, together with his remarkable ice trip over the Beaufort Sea in 1914, his westward loop in 1915 between Banks and Prince Patrick Islands, and MacMillan's trip in 1914 to the supposed site of Crocker Land would all seem to indicate that no land exists west of the known limit of the American Arctic Archipelago. Indeed, his discoveries would seem to define this limit more sharply; his first and second new islands lie on the direct line connecting the outer coasts of Grant Land and Prince Patrick Island, a line which in its simplicity recalls the abruptness with which other archipelago-beset platforms in regions of mediterranean structure—to which the Polar Basin in all probability belongs—break off toward the adjoining seas. However, such conclusions must await the publication of the final reports, to which the scientific world will look forward with the greatest interest.

A Narrative of the Crocker Land Expedition. Lieutenant Fitzhugh Green accompanied the Crocker Land Expedition in the capacity of engineer and physicist. He narrates his experiences in five recent issues of the *United States Naval Institute Proceedings* (September, 1917–January, 1918). The expedition touched Greenland in August, 1913, at Cape York (76° N.), the southern limit of the Whale Sound Eskimos. Thence along the coast stops were made to pick up Eskimo families and dog-teams for the forthcoming work. Proper stops were known to the Eskimos, for the tribal settling-places—as they should be termed rather than settlements—are well established. In the seasonal course of the food-quest migrations, southward for the seal and small game, northward for the caribou and bear, whose skins are as important as their meat, resort is made to the old stopping places. Usually they are selected on favorable topographic sites, on protected spots at the foot of southern exposures. Abundant remains testify to the antiquity of habitation.

With other stops to secure food for the winter the expedition reached Smith Sound but ice conditions prevented progress into Flagler Fiord, the proposed winter headquarters. Here other expeditions had found open water, but in the three summers of Green's stay in the Arctic the ice barrier never lifted from the north of Smith Sound. This is the hard lesson of the North, "one season or two, or even three (are never a criterion of ice conditions in any other season." In this contingency winter quarters were established at Etah (Foulke

Fiord), the nearest point convenient of access to Ellesmere Island and the main objective of the expedition—Crocker Land.

At Etah the physicist's first care was the erection of two meteorological stations, one at the base, the other on the plateau 2,000 feet above. When the narrative was written the records were not available; the narrator, however, comments on the powerful control of wind direction. Two main types of weather were experienced. With the north wind was cold, clear weather; where the air descended the steep plateau walls adiabatic warming raised the temperature "a merciful amount"; down the fiords the pristine iciness was unmitigated. A south wind invariably meant cloudy weather. Under a swell from the south, the ice cracks, exposing water surfaces of comparatively high temperature from which arises warm air, whose vapor condenses to form an insulating cloud barrier. At such times the weather would be warm and snowy.

Towards the end of the year (1913) preparations were made for the advance on Crocker Land. With the advent of the December moon a party set out to lay caches. By following the coast until solid floes gave a fairway to the opposite land Smith Sound was crossed without difficulty and a supply base made at the ill-famed Cape Sabine. At the base sledges were made and other equipment got ready, work in which the Eskimos instructed in the use of European tools proved highly skillful. On February 7, 1914, the party set out for the great objective. The first attempt failed: a second and successful start was made a month later under the low March sun. The route lay across the difficult crevassed ice of the plateau of Ellesmere Island, down the 5,000 feet of its abrupt descent to Bay Fiord; thence to Cape Thomas Hubbard (see the map accompanying the preceding item). From here on April 15 MacMillan and Green set out across the Polar Sea in search of the phanton land. The going was wretched, the apprehensive natives mutinous. Seventy miles out the white men were cheered by a faint shadow on the northwest horizon. "The Eskimos shook their heads. '*Puksuaq*,' they said—'it's just mirage.' And so it seemed, for in all the speed of our pursuit, the specter grew no nearer. Peary placed Crocker Land 130 miles out. At 105 miles we cached most of our food and ran for it. Two marches more placed us beyond the 150 mile mark. The day was perfect, crystal, clear horizon, and no wind. We climbed the highest berg and saw nothing." Yet on return to land the illusion appeared so realistically that "had we not been out, we too should have announced its discovery and urged its exploration." The farthest point reached was subsequently determined to be 82° 30′ N. and 108° 22.5′ W. Bad weather curtailed attempts at exploration of the coasts southwest and east, and the party went back as it had come, enjoying on the return splendid views of the white ranges of Axel Heiberg Island, discovered by Sverdrup in 1901. In all 1,300 miles were covered in three months. Much game was seen, and at the camp in Bay Fiord bituminous coal was struck.

During the second summer (1914) Green's scientific work included wireless experiments with radio kites and surveying, the latter including a hydrographic survey of Foulke Fiord. During the succeeding winter he was also able to add further to the map of northern Greenland by a survey of the coast as far north as Hall Basin. Results of this survey showed the work done by Hall, Kane, and Peary to be substantially correct with the exception of that part of the coast between Capes Calhoun and Constitution.

Close of the third summer (1915) saw the arrival of the first relief ship, the *Cluett;* the ill-luck attending her has been recorded in the *Review* (Vol. 1, 1916, pp. 145-146, and Vol. 2, 1916, p. 65). On an attempt to secure relief Green and two other members of the expedition later (January, 1916) made their way into South Greenland. Their long journey was carried out under the usual hardships attending Arctic travel, but for the scientific observer there were compensations. A few marches after rounding Cape Holm, the Devil's Thumb of the earlier explorers (74½° N.), the little party entered South Greenland, Greenland modified by Danish influence, a region of great interest for geographers and ethnographers.

Here, at the first settlement, Etusalik, "all was different": here the Eskimos have lost the old arts. "They cannot build snow houses or real rock igloos—have lost the art these four generations. Lumber can be purchased from southern trading stations, and sod-covered walls protect the outside of their wooden huts. They know not how to fashion soap-stone lamps, for the simple reason that the nearest missionary supplies excellent iron kettles. They wear sealskin breeches which are neither handsome nor warm, and sell their bearskins to the traders. With the profits they can buy guns and ammunition."

The sharp change at Cape Holm marks the beginning of a sequence of progressive cultural changes but these seem to depend not only on exterior human interference but also on geographical influences, most particularly climate, which limits the time possible for the various native occupations. In Greenland, however, white intervention arouses

particular interest because of the policy by which it is controlled. Nearly half a century ago the Danish Government closed the country to outsiders, in part for economic reasons but chiefly for the protection of the natives and for the maintenance of native initiative.

Besides the general interest in this humanitarian policy Greenland has peculiar interests for the United States. The treaty transfering the Danish West Indies to the United States contained a clause recognizing Denmark's right to extend her economic and political sphere over the entire island. The clause aroused much discussion (see Peary's letter to the *New York Times*, September 11, 1916), for the future significance of Greenland, as American explorers have pointed out, runs along economic and strategic lines. Already the country has a considerable export trade from the products of hunting, fishing, and mining, and development of the last in particular has only just begun. Lying between Europe and North America Greenland occupies a strategic location doubly significant by the splendid secure fiord harbors (Godhavn is open, at least in certain seasons, ten months of the year); and there is coal, graphite, and petroleum. "Greenland is going to have a chapter in naval history."

WORLD AND LARGER PARTS

The World's Food Supply. Under this title G. B. Roorbach outlines salient facts of food production in relation to the present situation (*Annals Amer. Acad. Polit. and Social Sci.*, Philadelphia, November, 1917). While a great variety of products enter into the world's supply, the number of staples is limited: they are the cereals rice, wheat, millet, rye, barley, the chief foods both in production and food value; corn, oats, and beans; potatoes; sugar; and meat, the least considerable of the staples. With the exception in part of sugar and rice the north temperate zone is the great producer of the staple foods, and Europe—a fact apt to be obscured by the industrial predominance of the continent—is the greatest producer of all, excluding rice, millet, and corn. In 1913 Europe contributed 65.4 per cent of the world's supply of wheat, oats, rye, barley; 90.5 per cent of the potatoes; 43 per cent of the sugar; 31.8 per cent of cattle. Even the most densely peopled and highly industrial countries produced more than half their own requirements. The percentage ratio of production to requirements for various countries is: United Kingdom, 53; Belgium, 57; Germany, 88; France, 93; Austria-Hungary, 98; United States, 100; Russia, 110; Canada, 123; Argentina, 148.

We are probably more familiar with Europe's large figures of food importation. If we add those for home production the seriousness of the European food situation needs little further demonstration. Naturally this is greatest in the case of wheat. On the average in the last three pre-war years (1911-13) the Western Allies imported 344,000,000 bushels of wheat, an amount about three-fifths of their total consumption. The neutral European countries imported 67,000,000 bushels, about one-third of their consumption. Russia, leading in the world's export, is now ruled out as a source of supply. Rumania, Bulgaria, Turkey are tributary to the Central Powers; according to pre-war reckoning they would make up the greater part of the German deficiency. The United States and Canada ranked next to Russia in the 1911-13 figures and Argentina next, but unfortunately the last, with great fluctuations of production, is not a dependable source. India and Australia together exported about as much as Canada, but Australia is now much hampered by shipping difficulties.

In corn (maize) production the United States is unique, accounting for over 70 per cent of the world's supply. Cultivation and consumption as human food are both susceptible of increases: corn is the food lending itself best to food conservation measures. Rice, the great staple of the East, is comparatively unimportant in the food supply of the West, though its food value is very high. It is, however, noteworthy that production in the United States has been considerably increased. This is also the case with another great product of the East, the soy bean. During war time meat production always diminishes rapidly. In the European countries wealthy enough to indulge in meat eating the situation is now very serious. Moreover the sacrifice of cattle is accompanied with loss of dairy products. Exportation from the United States in 1916-17 has been notable; meat exports increased fourfold, and enormous expansion was shown in butter, cheese, and condensed milk. While the late growth of meat consumption has greatly outdistanced the growth of production, the very great production of the United States should be remarked. It amounted to between three and four times the combined output of Australia, New Zealand, Argentina, and Canada. It is by the United States, with a normal excess of production of wheat, corn, barley, rye, meat, and potatoes and with a comparatively short voyage to Europe, that the great effort of food production and conservation must be made to meet the crisis in the world's food supply.

PHYSICAL GEOGRAPHY

Fog Formation. The formation of fog and mist, with reference to forecasting the occurrence of these phenomena, has been considered by Major G. I. Taylor of the Royal Flying Corps (*Quart. Journ. Royal Meteorol. Soc.*, Vol. 43, 1917, pp. 241-268). "Smoke fogs" require a very light wind and an inversion of temperature near the ground so that the fog shall not be dispersed vertically by turbulence or by convectional currents. The second of these conditions practically limits the formation of smoke fogs to winter.

Fogs which consist of water drops are the most frequent and the most complicated. Condensation is due either to cooling or to the mixture of two masses of air having different temperatures and containing different amounts of water vapor. Major Taylor spent six months during the summer of 1913 on the whaling ship *Scotia*, carrying out scientific work on the Grand Banks of Newfoundland. In his study of fog he was able in certain cases to secure data from the air above the surface of the water by means of kites. In every one of these cases the fog was due to air blowing off warm water onto the colder water of the Banks. The author is of the opinion, however, that cold air blowing over warm water may also give rise to fog. Observations of the height of these Grand Bank fogs showed that the fogs are often so shallow that the top of a ship's mast is in bright sunlight when it is impossible to see more than 80 or 100 feet along the deck. Occasionally, however, the vertical thickness of the fog may reach 3,000 feet. A third class of fog includes those formed on land, at night, during light winds or in calms. These are generally known as radiation fogs.

Major Taylor, who is attached as meteorologist to the Royal Flying Corps, gives special attention to the problem of fog forecasting. This is, of course, a very practical matter in aviation. He has prepared a "fog prediction diagram," in which the air temperatures and depression of the dew point are shown by the abscissas and the ordinates respectively. A series of lines is drawn across the diagram indicating conditions favorable or unfavorable for fogs during the night. The author believes that the use of this diagram should lead to a considerable improvement in local radiation fog forecasts in the warmer months. In winter, at temperatures below freezing, the wet-bulb readings are, of course, not reliable.

R. DEC. WARD

Effect of Short-Period Variation of Solar Radiation on the Earth's Atmosphere. H. Helm Clayton, long a student of weather periods, has recently demonstrated the connection between short-period changes of the sun's heat and terrestrial temperatures (*Smithsonian Misc. Colls.*, Vol. 68, No. 3, May, 1917). Clayton has compared the variations in solar radiation found by Abbot, Fowle, and Aldrich in 1913 and 1914 with temperature and pressure departures for many stations over the world. The temperatures of the tropics rise and fall two days behind the increases and decreases of sun's heat. Corresponding lowering of pressure reaching a minimum in a day after the maximum temperature, occurs as the expanded air apparently flows polewards in the upper levels. This overflow from the tropics seems to go chiefly to the established sub-permanent anticyclones over the coldest parts of the oceans in about latitude 35°, for there the pressure rises most. With this rise there is a fall in temperature in the eastern part of the anticyclone and a rise in the western, on account of the increased strength of the winds. Four to five days after the increase in solar radiation there appears to be a tendency to minimum pressures in sub-polar low-pressure centers of action. It seems to be true for the earth, therefore, that an increase in sunlight reduces the pressure in the low-pressure areas and raises that in the "highs." Over North America the result thus may be increased cold in winter and heat in summer.

That this effect operates on the smaller extra-tropical cyclones and anticyclones has been shown by M. A. Veeder and Ellsworth Huntington (*Geogr. Rev.*, Vol. 3, 1917, pp. 188-211 and 303-316).

There seems to be in both hemispheres an anti-clockwise elliptical movement of the centers of highest temperature departures. This movement, probably accompanied by movements of the centers of action, seems to be responsible for the masking of the effect of solar variations on the weather of a single place. Analyzing the solar changes and, independently, the temperatures of Buenos Aires, a coincident period of 22 days has been found, with a possible minor one of 11 to 14 days. As the period of solar rotation is 27 days this seems to be independent of the successive reappearances of sunspots.

CHARLES F. BROOKS

GEOGRAPHICAL NEWS

PERSONAL

PROFESSOR R. F. GRIGGS of Ohio State University gave a lecture on February 8 before the Geographic Society of Chicago on "The Mt. Katmai (Alaska) Explorations."

DR. JESSE WALTER FEWKES has been appointed Chief of the Bureau of American Ethnology in Mr. Hodge's place, whose resignation is noted below.

MR. FREDERICK WEBB HODGE, who has been the head of the Bureau of American Ethnology of the Smithsonian Institution since 1905, has resigned to accept a position in connection with the Museum of the American Indian, Heye Foundation, of New York City. Mr. Hodge's resignation took effect on February 28.

MR. ROBERT CUSHMAN MURPHY of the Brooklyn Institute Museum read a paper before the New York Academy of Sciences on February 11 on "The Sea Birds of the Southern Hemisphere: Some Systematic and Distributional Problems."

DR. FRIDTJOF NANSEN, whose presence in this country as Minister Plenipotentiary of Norway on a Special Mission to the United States was noticed in the November, 1917, *Review* (p. 404), read a paper before the Washington Academy of Sciences on January 31 entitled "Changes in Oceanic and Atmospheric Temperatures and Their Relation to Changes in the Sun's Activity."

DR. C. S. SCOFIELD of the U. S. Department of Agriculture read a paper before the Botanical Society of Washington on December 4, 1917, on "Geographical Aspects of Haitian Agriculture."

PROFESSOR WALTER S. TOWER of the Department of Geography of the University of Chicago has recently been commissioned in the Meteorological Section of the Signal Corps of the Army and been ordered into active service.

PROFESSOR R. D. SALISBURY, head of the Department of Geography of the University of Chicago, was presented with the Helen Culver gold medal of the Geographic Society of Chicago on January 26.

GEOGRAPHICAL PUBLICATIONS

(Reviews and Titles of Books, Papers, and Maps)

For key to classification see "Explanatory Note" in Vol. II, pp. 77-81

NORTH AMERICA

CANADA

General

—— **Canada, Sea-fisheries of eastern.** 212 pp.; maps, diagrs., index. *Proc. Committee on Fisheries, Game, and Fur-Bearing Animals of the Commission of Conservation, June 4-5, 1912.* Ottawa, 1912.

The papers were prepared by recognized authorities in their respective fields, so that the volume contains a good deal of material of interest and value both from the industrial and the scientific standpoint. One of the most important papers bears the same general title as the volume, and was prepared by J. J. Cowie, of the Department of Marine and Fisheries. Other leading papers are "Whitefish of the Great Lakes," by M. J. Patton; "Conservation of the Oyster" and "The Oyster Fisheries of Prince Edward Island," respectively by Joseph Stafford and J. A. Mathieson; "Needs of the Fisheries of Nova Scotia," by Dr. Howard Murray; "The Shad Fishery of Canada," by E. E. Prince, Commissioner of Fisheries; and "Fish Culture in Canada," by W. A. Found, Superintendent of Fisheries.

At present the Fisheries of Eastern Canada fall into two distinct classes: the deep-sea and the coastal fisheries. The latter are by far the most important in that eight-ninths of the men employed in fishing prosecute the in-shore fishery. Here the main fish caught are cod, hake, haddock, pollock, halibut, herring, mackerel, shad, alewives, smelts, flounders, sword-fish, sardines, salmon, and shell-fish such as lobsters, oysters, and clams. The off-shore fisheries prosecuted on the numerous shallow regions known as "banks" yield cod, haddock, hake, and halibut. Between 1870 and 1885, the fisheries of the eastern provinces experienced a steady growth, but during the succeeding twenty-five years there was little or no growth. The most prolific waters are those of the Gulf of St. Lawrence. The shores of this region are climatically advantageous for drying the catch, being relatively free from fogs. The shores of the Bay of Fundy and southern Nova Scotia, however, have frequent fogs, so that artificial means of drying are resorted to. This process brings results in about two days as compared with a period of three weeks when drying is done by the older natural process through the agency of sun and air. In money value the herring fishery is relatively small; but, since herring is a fundamental bait, it is, in some respects, the most crucial catch of all, for upon the abundance or scarcity of herring taken depends, in a large measure, the success or failure of the great hook-and-line fisheries. The most valuable commercial fishery of eastern Canada is the cod, whose annual output is worth about $4,000,000 out of a total of approximately $16,000,000 for all kinds of fish. AVARD L. BISHOP

MILLER, J. O., edit. **The new era in Canada: Essays dealing with the upbuilding of the Canadian commonwealth.** 421 pp.; ill. J. M. Dent & Sons, Ltd., London, Paris, Toronto, and E. P. Dutton & Co., New York, 1917. 8 x 5.

A book which should be read by every geographer, not so much for professional enlightenment as for clearer vision respecting Canadian ideals and the place which our neighbor to the north is coming to occupy among the nations. To suggest opportunities for national and civic service is the chief purpose of the volume. There are sixteen essays portraying the upbuilding of the Canadian commonwealth. The opening and closing papers are both from the ready pen of Stephen Leacock and deal, respectively, with "Democracy and Social Progress" and "Our National Organization for the War." The latter was prepared originally for the use of the Canadian government and was printed in an edition of a quarter of a million copies; it has received most favorable comment especially in England. Sir Clifford Sifton, chairman of the national conservation commission, has contributed an able paper on "The Foundations of the New Era." That a new era will follow the declaration of peace is confidently affirmed. "The signs," says Sir Clifford, "are already evident. Province after province has sought to abolish the liquor evil, that fruitful mother of moral and physical degeneration. While

our sons have been fighting in Europe the moral leaven has been working at home. Conventions of earnest-minded citizens have been held to consider schemes of social improvement. Men who scoffed a few years ago are the foremost now to demand reform. Many of them have given their sons to die a violent death in battle for a noble ideal, and they will not readily permit themselves to be influenced by any except the highest motives. Assuredly these strivings will be followed by momentous results."

The great wealth of Canada's natural resources is pictured by Professor Frank D. Adams of McGill University, while Sir John Willison writes ably of immigration and settlement. The bi-lingual question is skilfully presented by Professor Wrong of the University of Toronto. Other writers of equal prominence in their respective fields discuss such topics as national ideals in industry, Canadian national unity, Canada's future place in the Empire, equal suffrage and the work of women, financial problems, and the outlook for religious faith. On the whole the volume is of high grade. High motives prompted its preparation: the Canadian Red Cross Society will receive such profits as accrue from sales. AVARD L. BISHOP

VICTOR, E. A., edit. **Canada's future: What she offers after the war: A symposium of official opinion.** xv and 320 pp.; ills., index. The Macmillan Co., New York and Toronto, 1916. $1.50. 9½ x 6.

The book contains fifty-two concise papers by authoritative Canadian writers dealing with the present conditions in Canada and all leading phases of the industrial, economic, educational, and other achievements of the Dominion; also with the probable trend of future development as indicated by experience and progress in the past.

A book so produced may suggest that it is largely a symposium of praise; but this book is of another sort. It was written, for the most part, by specialists, men of science in the universities, directors of large industrial interests in the provinces, and other representative men who have come into wide recognition at home because their work of many years has helped to make Canada what it is at the present time. They tell of mistakes of the past and what has been learned from them; of achievements in agriculture, stock raising, and large industrial interests in spite of climatic and other limitations; and deal largely with the problems of the future. The index is by no means so comprehensive as consultants would like to have it. CYRUS C. ADAMS

GRIFFIN, WATSON. **Canada: The country of the twentieth century.** 283 pp.; maps, ills., index. Dept. of Trade and Commerce, Ottawa, 1915. 10 x 6½. [A review of Canada's resources, industry, and commerce prepared primarily for the business man.]

LAWLER, JAMES. **Aperçu historique sur l'exploitation des forêts au Canada.** *Bull. Soc. de Géogr. de Québec,* Vol. 10, 1916, No. 5, pp. 271-281.

MACOUN, J. M., AND M. O. MALTE. **The flora of Canada.** 14 pp.; ill. *Geol. Survey of Canada Museum Bull. No. 26: Biol. Ser. No. 6.* Ottawa, 1917. [Reprint from Canada Year Book, 1915, pp. 43-55, Census and Statistics Office, Ottawa.]

MILLAR, W. N. **The big game of the Canadian Rockies: A practical method for its preservation. (Conservation of Fish, Birds, and Game.)** Ills. *Proc. Committee on Fisheries, Game, and Fur-Bearing Animals of the Commission on Conservation, Nov. 1 and 2, 1915,* pp. 100-124. Toronto, 1916.

—— **Peace River District in the Provinces of Alberta and British Columbia, Description of surveyed townships in the.** 3rd edit. 262 pp.; maps, ills. *Topogr. Surveys Branch Bull. No. 35.* Dept. of the Interior, Canada, 1916.

THORSTEINSON, ELINA. **The Doukhobors in Canada.** *Mississippi Valley Hist. Rev.,* Vol. 4, 1917, No. 1, pp. 3-48. [An historical account of a peculiar Russian sect which has become established in western Canada.]

WHITE, JAMES. **Place-names in the Rocky Mountains between the 49th parallel and the Athabaska River.** *Trans. Royal Soc. of Canada,* Vol. 10, 1917, Ser. 3, pp. 501-535. [The list of names is preceded by a brief statement of the explorations chiefly responsible for their origin.]

WHITING, LILIAN. **Canada the spellbinder.** x and 322 pp.; map, ills., index. E. P. Dutton & Co., New York, and J. M. Dent & Sons, Ltd., London and Toronto, 1917. 8 x 5½.

—— ***Canada, Map of the Dominion of.*** 1:6,336,000. Dept. of the Interior, Ottawa, 1916. [The standard small-scale general map of the Dominion.]

—— ***Canada, Railway map of the Dominion of.*** 1:2,217,600. In 8 sheets. Dept. of the Interior, Ottawa, 1914. [The standard large-scale map of the Dominion. No relief; railroad systems distinguished by color.]

United States

General

Southworth, G. V. D., and S. E. Kramer. **Great cities of the United States: Historical, descriptive, commercial, industrial.** ix and 309 pp.; maps, ills., index. Iroquois Publ. Co., Inc., Syracuse, New York, 1916. 70 cents. 7½ x 5.

In their preface the authors compare the history of a country with its geography; as one is largely the story of its great men so the other is largely the story of its great cities. The book deals with the ten largest cities of the United States together with San Francisco, New Orleans, and Washington. The aim has been to group the important facts of the geography of this country around these thirteen cities. This plan has been carried out very successfully, and the book may be recommended as a supplement to the ordinary school geography, which of course it by no means supersedes. An interesting historical sketch introduces the study of each city, the methods and causes of its development are made clear, and local details are added to complete the picture in the student's mind. The special difficulties which many cities have had to overcome, for example transportation in New York, water supply and drainage in Chicago and New Orleans, are described. The illustrations are numerous and well chosen. A map of each city is included and there are a number of special maps which should be useful to an active-minded teacher. Among these are maps illustrating "New York's Subway and Bridge Connections," "Chicago's Canals," and "Boston's Land and Water Connections." At the conclusion are a number of tables with figures taken from government reports. The style is the somewhat chatty sort now commonly found in school texts.

R. H. Jones

Keyes, Charles. **Man's completion of nature's supremest effort on the Great Plains.** *Journ. of Geogr.*, Vol. 14, 1915-16, No. 7, pp. 257-259. [Stimulated desiccation through utilization of streams for irrigation.]

Klingberg, E. W. **Glimpses of life in the Appalachian Highlands.** *South Atlantic Quart.*, Vol. 14, 1915, No. 4, pp. 371-378.

Krueger, L. B. **Shipbuilding in the United States, past and present.** *Journ. of Geogr.*, Vol. 15, 1916-17, No. 8, pp. 251-258.

Loughlin, G. F. **Slate in 1916.** *Mineral Resources of the United States*, 1916, Part II:8, pp. 61-72. U. S. Geol. Survey, Washington, D. C., 1917. [The slate industry by states. Pennsylvania and Vermont led in production, the two producing 88 per cent of the total. Less slate was sold for roofing in 1916, but more for school purposes. A return to the use of school slates, possible because of the increasing cost of paper, would still further increase this item of sales.]

Lundgren, Leonard. **Forests of the United States.** Map, ills. Reprint from *Engineering Mag.*, Vol. 1, 1915, No. 1, pp. 1-17.

Lutz, F. E. **Faunal dispersal.** *Amer. Naturalist*, No. 594, Vol. 50, 1916, pp. 374-384. [A discussion of fundamental differences in theories of faunal dispersion with specific reference to the criteria brought forward by Charles C. Adams in his paper "Southeastern United States as a Center of Distribution of Flora and Fauna" (*Biol. Bull. 7*, 1902, p. 122).]

Marshall, R. B. **Triangulation and primary traverse, 1913-1915.** vi and 655 pp.; map, ill., index. *U. S. Geol. Survey Bull. 644.* Washington, D. C., 1916.

Marvin, C. F. **Applied meteorology and the work of the Weather Bureau.** *Proc. Ohio Acad. Sci.*, Vol. 6, 1915, Part V, pp. 265-276.

Murphy, L. S. **The red spruce: Its growth and management.** 100 pp.; map, diagrs., ills. *U. S. Dept. of Agric. Bull. No. 544* (contribution from The Forest Service). Washington, D. C., 1917.

—— **National Park Service, Report of the Director of the, to the Secretary of the Interior for the fiscal year ended June 30, 1917.** viii and 258 pp.; maps, diagrs., ills. Dept. of the Interior, Washington, D. C., 1917.

Nellis, J. C. **Production of lumber, lath, and shingles in 1915 and lumber in 1914.** 45 pp.; map, diagrs., ills. *U. S. Dept. of Agric. Bull. No. 506.* Washington, D. C., 1917.

Newlands, F. G. **River regulation and flood control.** 4 pp. *Congressional Record*, 64th Congr., 1st Sess. Washington, D. C., 1916.

O'Conor, J. F. X. **The Jesuit Indian missions in the United States, 1565 to 1916.** *Proc. Nineteenth Internatl. Congress of Americanists held at Washington, Dec. 27-31, 1915*, pp. 487-502. [Smithsonian Institution], Washington, D. C., 1917.

PRAEGER, OTTO. **Aërial mail routes proposed by the Post Office Department and in connection with the transcontinental aëro contest.** Ill. *Flying*, Vol. 6, 1917, No. 2, p. 143.

PUTNAM, G. E. **The land credit problem.** (Humanistic Studies, Vol. 2, No. 2.) *Bull. Univ. of Kansas*, Vol. 17, 1916, No. 18, pp. 1-107. Lawrence.

REDFIELD, W. C. **Our fish need a P. D. Armour.** Ills. *Nation's Business*, Vol. 5, 1917, No. 9, pp. 31-33. [Treats of America's unused supplies of sea-food.]

STONE, R. W. **Phosphate rock in 1916.** *Mineral Resources of the United States*, 1916, Part II:6, pp. 29-41. U. S. Geol. Survey, Washington, D. C., 1917. [Shows the distribution of the world's deposits of phosphate rock.]

WINCHESTER, D. E. **Oil shale in the United States.** Ills. *Econ. Geology*, Vol. 12, 1917, No. 6, pp. 505-518.

WOODWARD, K. W. **Tree growth and climate in the United States.** *Journ. of Forestry*, Vol. 15, 1917, No. 5, pp. 521-531. [From the limited data available a correlation is attempted between the factors of forest productivity—diameter, height, growth, density, yield—and climatic conditions. The discussion recognizes fifteen forest types of which it is concluded that the most valuable for forest-producing purposes are those of the Douglas fir, white pine, and southern bottom lands.]

CAMPBELL, M. R. ***Map showing coal fields of the United States.*** [1:2,400,000]. In 2 sheets. Accompanying "The Coal Fields of the United States," by R. Campbell, *U. S. Geol. Survey Professional Paper 100-A*. Washington, D. C., 1917. [An important large-scale map. Base used is the General Land Office map of the United States.]

—— ***United States: The battle fronts of Europe.*** [Extent of areas held by Teutonic Allies September, 1917, shown as if on United States territory.] 1 in. to 250 mi. (1:15,840,000.) Stanford's Geographical Establishment, London, 1917.

—— ***United States of America, Military map of the, showing location of all forces in training.*** [1:6,000,000]. Union Pacific R. R. Co., Chicago, 1917.

EUROPE

BRITISH ISLES

JOHNSTON, J. B. **The place-names of England and Wales.** vii and 532 pp.; bibliogr., indexes. John Murray, London, 1915. 15s. 9 x 6½.

This work, a dictionary of English and Welsh place-names, with the oldest known spellings and probable derivation of each, is by the author of "The Place-Names of Scotland" (2nd edit., 1903). It contains the names of all villages and towns in the Postal Guide, as also those of all mountains, rivers, and islands—in all some 6,000 names.

The author, curate of St. Andrews, Falkirk, has labored for twenty years on this compilation. He has had access to the libraries of Edinburgh and Glasgow for original sources—Old English charters and chronicles, the Domesday Book, and specially the recent issues of the Close and Patent Rolls, heretofore practically untouched. A short bibliography of modern works used is given on p. 528, especially those on the place-names of the various counties by Skeat, Duignan, Wyld and Hirst, M'Clure, Baddeley, and Mutschmann. The dictionary, however, is hampered by the omission of a tabulated bibliography of original sources, which one must seek in W. G. Searle's "Onomasticon Anglo-Saxonicum," 1897. Thus the work of Glidas of the sixth century, which speaks of 28 cities of the Britons, is not mentioned; while that of Nennius, "Historia Britorum," c. 810 A. D., purporting to be a list of these cities, is mentioned often by author but not by title. The author found little assistance in the English gazetteers (e. g. Cassell's, 6 vols.; Bradner's, 6 vols.), or in the two articles in the last (11th) edition of the Encyclopædia Britannica, "Place-Names of England," by A. Mawer, Vol. 9, pp. 417-418, of Wales, by H. M. Vaughan, Vol. 28, p. 260. He has used extensively the etymologies in the Oxford Dictionary. A few names are not properly located, which is a difficulty for scholars outside of Great Britain; e. g. the Cotswold Hills (216), Gateshead (272), Hartlepool (293), Hauxley-on-Coquet (295).

The work makes no pretensions to completeness, but is merely a beginning in a field in which no other conspectus has as yet appeared. The study of English place-names is still young; apart from notes to "Anecdota Oxoniensia," the first work of permanent value on this subject is the "Place-Names of Cambridgeshire," by W. W. Skeat, which appeared only in 1901. The case with Wales is still worse. The only book dealing with the whole subject is the unscientific "Place-Names of Wales" by T. Morgan (2nd edit., 1912). The Britannica article mentioned is characterized on p. 67 as the list of a

"tyro." The author is wrong in saying (p. 69) that in Wales "no Roman inscriptions have yet been found," as also in the statement (p. 70) that in the Antonine itinerary "we can identify only three known names of today, and there is doubt even among these." It is also misleading to say (p. 4) that this Antonine road book, which is the best account of Celtic names (containing 22 town- and 11 river-names), was only put into final shape in A. D. 380, since this compilation belongs to the beginning of the third century.

The Introduction contains nine short chapters (pp. 1-83) explanatory of the dictionary, which forms the bulk of the book (pp. 87-532). In the second chapter, "Roman and Latin Names," the author points out (p. 5) what is not known even to all classical students that the name Chester, found alone or in combination, is not the certain sign of Roman origin or proof of the existence on the site of a former "castra." For none of these "caster" names go back as names to Roman days. Some, e. g. Alia Castra for Alcester, are spurious inventions; Chester itself as a name is late; few are earlier than the beginnings of the Old English chronicles; thus Gloucester is first found in a grant of 681 as Gleawecensdre and Worcester is nearly as early. Consequently, -caster, Old English ceaster, is a Saxon rather than a Roman appellative. Similarly few names embody the Latin "colonia," e. g. Lincoln, Colchester. Very possibly the latter, Old English Colenceaster, means merely "camp on the Colne," and this river-name is Celtic, so that Colchester is of Saxon and not of Roman make. Thus there are hardly any real Latin names in England.

In the chapter on "The Keltic Element"—the most difficult problem in English and Welsh names—the author unscientifically differentiates, on the basis of dolichocephalic skulls which prove the existence of a pre-Celtic race, between Celtic place-names (he lists over 400 on pp. 18-21) and pre-Celtic (he lists 20 as possible on p. 22). He believes these "pre-Aryan" names are confined chiefly or altogether to rivers—Biddle, Bollin, Croco, etc. There is no linguistic proof, however, that such names are not purely Celtic. His statement (p. 7) that the Aryan Celts came to England "not a great many centuries before Julius Caesar" needs revision in the light of recent investigations into the age of Indo-European speech groups in Europe. He is probably right in saying (pp. 7-9) that the 50 Ogam inscriptions found in Wales, western Devon, and Cornwall date from late in the Roman occupation and are the work of the early Goidels (Gaels) who crossed over from southern Ireland to Pembroke, while of the earliest Goidels in England we know next to nothing. He suggests with good reason that the Brythons, who followed the Goidels into Britain, came from tribes of the Belgae, since a comparison of Neolithic skulls of England and Belgium shows marked similarities. Though pointing out that too much stress has been laid on the number of English Celt names (especially of rivers), he goes to the other extreme in stating (p. 8) that over a large area of England "there are next to no Keltic names at all." His derivation of Ox- in Oxford (p. 11) and that of the Isis (the Latin name of the Thames above Oxford), from the Celtic root *uisc*, "water" or "river" (variously spelt now as axe, exe, esk, usk), is interesting. However, his equation (p. 272) of Gateshead (on Tyne) with Gabrosentum, deriving the latter from Celtic *gabar*, "goat," is probably wrong. Gabrosentum was almost certainly on the western and not on the eastern coast of Britain, and Gateshead doubtless formed the end of an old Roman road, so that the name Gateshead is probably not Celtic at all but Saxon (from Old English *zeat*, "gate").

In the chapter on "The English Element" he shows that the town names (p. 31) of Britain are overwhelmingly English as well as those of rivers (p. 29). In "The Scandinavian Element" he states that at least 15 Norse names (p. 39) survive in Cheshire alone, and that, inasmuch as only 4 of them appear in Domesday, most of them came in after the Conquest long after the end of Danish rule in 1042. Practically no Norman names, apart from those beginning with "beau" and "bel" (p. 63), survive in England. But Norman personal names are found very frequently appended to Old English ones.

In "The Names of Wales, Monmouth, and Cornwall" he is right in saying that few Roman -caster names are left. He makes a real contribution in deriving Cardiff (pp. 67-68; 185) from the Celtic *caer* or *car*, "fort," and Didius, the Roman general who in 50 A. D. fought against the British tribe of the Silures of that region. Thus Cardiff is one of the earliest Roman stations in Britain. Another contribution is the derivation of Denbigh. Whereas the author of the Britannica article on Wales refers it to *din*, "fort," Mr. Johnston shows (pp. 67; 230) that the name is not Welsh but Danish and means "dwelling of the Dane." He also points out (pp. 79-80; 521) the same author's fallacy in saying that Wrexham was Wrightesham in the Anglo-Saxon chronicle, for Wrightesham is not the original name and is not mentioned in that chronicle. The name is not Welsh but Anglo-Saxon, and probably comes from Wrytsleof, the "dux" at Crediton in 1026, and simply means Wrytsleof's home. Every Welsh river-name as

well as mountain-name (except Snowdon, which is Old English, p. 449) is Celtic (or pre-Celtic?); but strangely enough five out of the twelve Welsh counties are Old English, Danish, Norman, or English in origin (p. 75).

The book, with all the shortcomings of a pioneer work in such an enormous and complicated field, deserves much praise. It not only arouses the widespread and legitimate curiosity of the general reader interested in the origin of English names, but it furnishes many sidelights on the complex history of Britain and explains many of the racial idiosyncrasies of the various peoples which have inhabited it.

WALTER WOODBURN HYDE

FIRTH, J. B. **Highways and byways in Nottinghamshire.** xviii and 426 pp.; maps, ills., index. Macmillan & Co., Ltd., London, 1916. $2.00. 8 x 5.

FORDHAM, MONTAGUE. **A short history of English rural life from the Anglo-Saxon invasion to the present time.** With a preface by Charles Bathurst. xvi and 183 pp.; diagr., index. George Allen & Unwin, Ltd., London, and Charles Scribner's Sons, New York, 1916. 1s. 9d. 8 x 5½.

FRANKLIN, THOMAS, AND E. R. SHEARMUR. **British Isles.** 40 pp.; maps. (Practical Geography Notebooks based upon the Atlas Geographies.) W. & A. K. Johnston, Ltd., London, [1916]. 4d. 10 x 7½.

GRAS, N. S. B. **The evolution of the English corn market from the twelfth to the eighteenth century.** xiii and 498 pp.; bibliogr., index. (Harvard Economic Studies, Vol. 13.) Harvard University Press, Cambridge, 1915. $2.50. 9 x 6.

GRAY, H. L. **English field systems.** x and 568 pp.; maps, index. (Harvard Historical Studies, Vol. 22.) Harvard University Press, Cambridge, 1915. $2.75. 9 x 6.

HARDING, CHAS. **The remarkable warmth of January, 1916.** *Nature*, No. 2417, Vol. 96, 1916, Feb. 24, pp. 703-704. [In England.]

INGRAM, A. E. **Bradford.** 16 pp. *Suppl. to Commerce Repts.*, Ann. Series, 1916, No. 19g. Bur. of Foreign and Domestic Commerce, Dept. of Commerce, Washington, D. C. [In spite of difficulties and anxieties the Yorkshire woolen mills have "experienced a prosperity never equaled since the memorable times of 1870-71." The American textile trade has also had a share of this prosperity: its purchases of colonial wools "have more than trebled those of the preceding year and are far in excess of anything ever known before, more than double even those of 1897, that year of large imports of free wool in full view of a coming tariff.]

JACKSON, C. E. **The place-names of Durham.** 115 pp.; bibliogr. George Allen & Unwin, Ltd., London, 1916. 2s. 6d. 9 x 6.

JEFFREYS, HAROLD. **On the vegetation of four Durham coal-measure fells: General description of the area and its vegetation.** Maps, ills. *Journ. of Ecology*, Vol. 4, 1916, No. 3-4, pp. 174-195.

KEITH, A. **The ethnology of Scotland.** *Nature*, No. 2501, Vol. 100, 1917, Oct. 4, pp. 85-88. [Review of recent contributions to this subject.]

AUSTRALASIA AND OCEANIA

MELANESIA, MICRONESIA, POLYNESIA

MACCAUGHEY, VAUGHAN. **The economic woods of Hawaii.** *Forestry Quart.*, Vol. 14, 1916, No. 4, pp. 696-716.

The Hawaiian archipelago, because of its remoteness from continental areas, is remarkable for the highly endemic character of its fauna and flora. It consists of over twenty islands and extends from the great volcanic island of Hawaii in the southeast to tiny Ocean Island in the northwest, a distance of 2,000 miles. The eight large islands, which are the only ones inhabited, have a combined area of 6,454 square miles, and of this more than half belongs to Hawaii. The other islands are small and barren and do not total more than 20 square miles.

The larger islands were formerly heavily forested in their interior, mountainous districts, but within historic time there has been extensive deforestation, and two of the islands (Lanai and Kahoolawe) have been completely denuded by goats and cattle.

The lowland climate is mild and equable, ranging from 65° to 85° F., with an average of 75° for the year. The high mountains of Maui and Hawaii (8,000–13,825 feet) have snow and ice, and there is a drop of about four degrees in temperature for each thousand feet of ascent. The main axis of the islands opposes the heavily water-laden trade winds which blow almost continuously from the northeast, producing pronounced humid and arid regions. The forest reaches its finest development in the rainy zone, but there are

some tall species on the barren lava flows and other xerophytic regions. In some regions the annual precipitation is from 400 to 500 inches, and the value of the forests in protecting the watersheds far exceeds their importance for timber.

The ohia lehua (*Metrosideros polymorpha*) is the most abundant tree, forms the largest pure stands, and varies from a stunted creeper in the swamps to a rather slender timber tree over a hundred feet in height in the great jungle forests. The koa (*Acacia koa*) produces the most valuable wood. Much of the koa forest has been despoiled and the timber is becoming scarce. The kukui, or candle-nut tree (*Aleurites moluccana*), inhabits the moist and mesophytic regions and produces large, hard-shelled, oily nuts which yield an oil similar to the tung oil of China.

The mesquite, algaroba, or kiawe (*Prosopis juliflora*), which has transformed thousands of acres supposedly worthless into valuable pasture land, was introduced from Mexico in 1837. The flowers afford excellent bee pasturage, the pods and seeds are reduced to meal for stock food, and the wood is valuable for fuel.

The native sandalwoods of Hawaii are semi-parasitic in habit, and the young trees presumably obtain a portion of their sustenance from the roots of other trees such as the koa. This timber was extensively exploited between 1790 and 1820, and only small trees now remain. The koko (*Euphorbia lorifolia*) and a varietal form yield a latex which may prove of value as a source of rubber and chicle.

There is a considerable list of other trees locally valuable for special uses but of too limited occurrence for exploitation. Two genera of palms are native, and others have been introduced. There are no conifers. The tree ferns are "among the crowning glories of Hawaii's beautiful jungle forest." SAMUEL J. RECORD

ANGENHEISTER, G. **Die luftelektrischen Beobachtungen am Samoa-Observatorium 1912-13.** Diagrs. *Nachrichten von der Kön. Gesell. der Wiss. zu Göttingen, Math.-physik. Klasse*, 1914, No. 2, pp. 191-206.

BRANDSTETTER, RENWARD. **An introduction to Indonesian linguistics.** Translated by C. O. Blagden. xi and 251 pp. (Asiatic Society Monographs, Vol. 15.) Royal Asiatic Society, London, 1916. 7s. 6d. 8½ x 5½.

CROSE, W. M. **American Samoa: A general report by the governor.** 40 pp.; ill., bibliogr. Navy Dept., Washington, D. C., 1916. [Report prepared in 1912: statistics up to 1911 (inclusive).]

DAVIS, W. M. **The origin of certain Fiji atolls.** Diagrs. Reprinted from *Proc. Natl. Acad. of Sci.*, Vol. 2, 1916, Aug., pp. 471-475.

FOYE, W. G. **The geology of the Fiji Islands.** Reprinted from *Proc. Natl. Acad. of Sci.*, Vol. 3, 1917, Apr., pp. 305-310.

FOYE, W. G. **The geology of the Lau Islands.** Maps. *Amer. Journ. of Sci.*, No. 257, Vol. 43, 1917, pp. 343-350. ["The Lau group consists of fifty or more islands lying east of the two main islands of Fiji. They are scattered over 300 miles of the ocean floor from the 17th to the 21st parallels of south latitude and between the 178th and 179th meridians of west longitude. The average island is, perhaps, 4 or 5 miles in diameter and 300 or 400 feet in height."

"The Lau islands are believed to have been formed by volcanic activity about the middle of the Tertiary period. They were later maturely eroded, submerged, and overlain unconformably by 300 to 500 feet of coraliferous limestones. Still later they were elevated, eroded, and a second period of basaltic eruptivity spread its debris over the eroded complex. In recent times certain of the islands in which limestones are alone exposed have been eroded to submerged platforms by atmospheric solution and, aided by a recent subsidence, atolls have developed in their place."

For a general geographical account of the group by the same author, see the November, 1917, *Geogr. Rev.*]

FRATER, M. **The volcanic eruption of 1913 on Ambrym Island, New Hebrides.** Ills. *Geol. Mag.*, Decade 6, Vol. 4, 1917, pp. 496-503.

GREGORY, J. W. **The Ambrym eruptions of 1913-14.** Map, bibliogr. *Geol. Mag.*, Decade 6, Vol. 4, 1917, pp. 529-540. [New Hebrides: see above under "Frater, M."]

HASWELL, WILLIAM. **Remarks on a voyage in 1801 to the island of Guam.** With an introduction and annotations by L. W. Jenkins. Map, ills. *Essex Inst. Hist. Collections*, Vol. 53, 1917, No. 3, pp. 193-214. Salem, Mass.

—— **Hawaii, Territory of, Report of the Board of Commissioners of Agriculture and Forestry for the biennial period ending December 31st, 1914.** viii and 244 pp.; ills. Honolulu, 1915.

JAGGAR, T. A., JR. **Lava flow from Mauna Loa, 1916.** Map, diagrs., ills. *Amer. Journ. of Sci.*, No. 256, Vol. 43, 1917, pp. 255-288.

JAGGAR, T. A., JR. **Thermal gradient of Kilauea lava lake.** Diagr. *Journ. Washington Acad. of Sci.*, Vol. 7, 1917, No. 13, pp. 397-405.

JAGGAR, T. A., JR. **Volcanologic investigations at Kilauea.** Map, diagr., ills. *Amer. Journ. of Sci.*, No. 261, Vol. 44, 1917, pp. 161-220.

JUDD, C. S. **Æolian erosion in Hawaii.** Ills. *Amer. Forestry*, No. 280, Vol. 23, 1917, pp. 239-240. [A brief discussion, with two good illustrations, of eolian erosion on the island of Kahoolawe. Overgrazing has started land erosion on what was always a more or less barren island and one used for a time as a place of exile for criminals. Sheep and goats were placed upon the island and overran it by the thousands, upsetting the balance of nature. Exposed to the full force of the trade winds the remaining turf was destroyed and the loose soil exposed, and this poured off the lee of the island on windy days in clouds of light red dust. With a view to reclaiming the soil over 4,000 goats have been exterminated in the last eight years, and recently there has been a noticeable growth of native grass and weeds. The mesquite of the Southwest has been spread by a few work horses which had been allowed to graze on the island, and this promises soon to become an extensive forest for the production of wood and beans, as well as blossoms for bee pasturage.]

MACCAUGHEY, VAUGHAN. **A survey of the Hawaiian land flora.** Map, ills. *Botanical Gazette*, Vol. 64, 1917, No. 2, pp. 89-114.

MACCAUGHEY, VAUGHAN. **The food plants of the ancient Hawaiians.** *Scientific Monthly*, Vol. 4, 1917, No. 1, pp. 75-80.

MACCAUGHEY, VAUGHAN. **The physique of the ancient Hawaiians.** *Scientific Monthly*, Vol. 5, 1917, No. 2, pp. 166-174.

MACCAUGHEY, VAUGHAN. **Vegetation of Hawaiian lava flows.** Maps, diagrs., ills. *Botanical Gazette*, Vol. 64, 1917, No. 5, pp. 386-420.

MALINOWSKI, B. **The natives of Mailu: Preliminary results of the Robert Mond research work in British New Guinea.** Ills. *Trans. and Proc. Royal Soc. of South Australia*, Vol. 39, 1915, pp. 494-706. Adelaide. [The Mailu inhabit a portion of the extreme southeast coast of Papua. Ethnically they are classed as "Western Papuo-Melanesians."]

MJÖBERG, ERIC. **To explore unknown New Guinea by air route.** Map, ill. *Flying*, Vol. 6, 1917, No. 2, pp. 149 and 155. [Outline of a project discussed in the same author's article in the February, 1917, *Geogr. Review* (Vol. 3, pp. 89-106).]

—— **Papua: Annual report for the year 1914-15.** 197 pp.; maps, ills. Commonwealth of Australia, Victoria, 1916.

PREUSS, PAUL. **Wirtschaftliche Werte in den deutschen Südseekolonien.** *Der Tropenpflanzer*, Vol. 19, 1916, No. 9, pp. 493-514. [Conclusion of an article the previous installments of which are in numbers not received by the Society.]

ROUTLEDGE, SCORESBY. **Easter Island:** Maps, ills. *Geogr. Journ.*, Vol. 49, 1917, No. 5, pp. 321-349 (discussion, pp. 341-349). [Abstracted in the September, 1917, *Review*, pp. 221-222.]

—— **Samoa, The climate of.** *Symons's Meteorol. Mag.*, No. 609, Vol. 51, 1916, Oct., p. 129.

STRONG, W. M. **Notes on the North-Eastern Division of Papua (British New Guinea).** *Geogr. Journ.*, Vol. 48, 1916, No. 5, pp. 407-411.

WEGENER, KURT. **Temperatur und Regen in Samoa 1909 und 1910 in gedrängter graphischer Darstellung.** Diagrs. *Nachrichten von der Kön. Gesell. der Wiss. zu Göttingen, Math.-physik. Klasse*, 1914, No. 1, pp. 95-100.

WESTERVELT, W. D. **Hawaiian legends of volcanoes.** With a foreword by T. A. Jaggar, Jr. xv and 210 pp.; map, ills., index. Ellis Press, Boston, and Constable & Co., London, 1916. $1.50. 7½ x 5.

WOOD, H. O. **Notes on the 1916 eruption of Mauna Loa.** Maps, ills. *Journ. of Geol.*, Vol. 25, 1917, No. 4, pp. 322-336; No. 5, pp. 467-488.

WOODFORD, C. M. **On some little-known Polynesian settlements in the neighbourhood of the Solomon Islands.** Maps, ills. *Geogr. Journ.*, Vol. 48, 1916, No. 1, pp. 26-54.

—— ***New Caledonia, Geological map of, to illustrate a paper by R. H. Compton.*** 1:1,250,000. From the *Geogr. Journ.*, Feb., 1917.

—— [***Topographic map of the Hawaiian Islands.***] ***Hilo Island and County of Hawaii, Hawaii,*** sheet. 1:62,500. Surveyed in 1912-14. U. S. Geological Survey, Washington, D. C., 1917.

POLAR REGIONS

Arctic

BARTLETT, R. A., AND R. T. HALE. **The last voyage of the *Karluk*, Flagship of Vilhjalmur Stefansson's Canadian Arctic Expedition of 1913-16.** 329 pp.; maps, diagr., ills. Small, Maynard & Co., Boston, 1916. $2.50. 9 x 6.

This is the story of twenty-nine members of Stefansson's Canadian Arctic Expedition who drifted westward on the flagship *Karluk*, in the fall of 1913, while their leader and an Eskimo were on shore to procure fresh meat for the party (*Bull. Amer. Geogr. Soc.*, Vol. 46, 1914, pp. 520-523). Soundings off Point Barrow showed that the drift to the northwest had already carried the party into ocean depths. They found the continental shelf again off the coast of Asia, as was to be expected from the *Jeannette's* drift. The party were carried within twenty-five miles of the supposed position of Keenan Island, but a telescopic lookout for hours from the masthead revealed no land. Both seal and bear were in plenty. The book is wholly given to large and small detail of the drift, which had its tragical side. Thirteen men perished after the *Karluk* sank, including three who died on Wrangell Island. The only white man of large polar experience was Bartlett, and there is evidence in this book that his authority was not properly recognized. Two small parties left Shipwreck Camp, and no detail of their fate is known. No lives were lost in the party that Bartlett piloted to Wrangell Island till after he left it. The rescue expeditions that went to Wrangell Island examined all sides of Herald Island and were convinced that none of the men reached it. CYRUS C. ADAMS

BRUUN, DANIEL. **Erik den Røde og Nordbokolonierne i Grønland.** ii and 238 pp.; diagrs., ills., bibliogr. Gyldendalske Boghandel (Nordisk Forlag), [Copenhagen], 1915. 8½ x 6.

By the recent sale of the Danish West Indies, Denmark acquires, as part of the purchase price, complete sovereignty over Greenland, the United States renouncing any possible rights of discovery. In this connection it is interesting to read Mr. Bruun's account of the early Norse occupation of Greenland. Eric the Red, the hero of his book, was the father of Leif the Lucky, whose discovery of America about the year 1000 is now well attested by scholars. Eric was born in the southern part of Norway, but, his father being banished for manslaughter, Eric went with him to Iceland, where they settled in the only land left to them, the barren strip under the glacier on the northwestern point of the island. Thence it was not far to Greenland, and when Eric, in his turn, committed manslaughter and was banished from his new home, it seemed natural to him to steer his course for the western land. He rounded Cape Farewell and made his way through the heavy drift ice to a spot on the southwestern coast near what is now Julianehaab. There he built his home, the first white colonist of Greenland. He named the land thus in order to attract settlers, and presumably there were many unruly spirits in Iceland, for soon two large settlements had grown up in the new land, one around Eric's home, the other farther north on the west coast.

Soon, however, the knowledge of Greenland became lost to the parent country, and there is even a tale that the German Hansa merchants in Bergen, in 1484, killed forty sailors, the only people who still knew the way thither. Be that as it may, when the Englishman, John Davis, landed on the coast of Greenland, in 1585, he found no white men, but only Eskimos. Mr. Bruun has explored the ruins of old Norse occupation for the Government. He found eighteen groups of buildings, including churches, dwelling-houses, stables, and servants' quarters. His scholarly account is illustrated with a number of interesting maps and pictures. The work is published by the aid of the Raben-Levetzau Foundation in Denmark. HANNA ASTRUP LARSEN

FICHELLE, ALFRED. **De Tromsoe à l'Iénisséi par l'Océan Glacial.** *Bull. Soc. de Géogr. Commerc. de Paris*, Vol. 39, 1917, No. 4-5-6, pp. 154-157. [A voyage (1916) successfully accomplished against serious difficulties. Compare note in *Geogr. Rev.*, Vol. 3, 1917, pp. 151-152.]

GREEN, FITZHUGH. **Arctic duty with the Crocker Land Expedition.** Map, ills. *U. S. Naval Inst. Proc.*, Vol. 43, 1917, pp. 1941-1976; pp. 2193-2224; pp. 2455-2494; pp. 2799-2832; Vol. 44, 1918, pp. 75-105. [Abstracted in this number under "Geographical Record."]

MACMILLAN, D. B. **In search of a new land.** Map, ills. *Harper's Mag.*, No. 785, Vol. 131, 1915, pp. 651-665; No. 786, pp. 921-930.

MERCANTON, PAUL. **État magnétique de basaltes groënlandais.** *Comptes Rendus Hebdomadaires des Séances de l'Acad. des Sci.* [*de Paris*], Vol. 165, 1917, Nov. 5, pp. 632-634.

NANSEN, FRIDTJOF. **Spitsbergen waters: Oceanographic observations during the cruise of the "Veslemöy" to Spitsbergen in 1912.** Maps, diagrs., ills., bibliogr. *Videnskapsselskapets Skrifter: 1. Mat.-Naturv. Klasse*, 1915, Art. No. 2 (pp. 1-132). Jacob Dybwad, Christiania, 1916. [The expedition was undertaken primarily to obtain data on the salinity of the deep waters of the North Polar Basin. Measurements of currents formed another branch of investigation.]

SPEERSCHNEIDER, C. I. H. **The state of the ice in the Arctic seas: Summary, average, limits, etc.** Maps. Special Print *Nautical Meteorol. Ann.*, 1916, 16 pp.; 1917, 25 pp. Danske Meteorol. Inst., Copenhagen, 1917. [A parallel account in Norwegian and English of the limits of ice in the Arctic seas between Labrador and Norway and northward to the limits of observation. The report is accompanied by instructive maps showing the average limit, the extreme minimum limit, and the extreme maximum limit of the ice, and the extreme limit of icebergs. There are notes on the navigation of the sea, the probable best routes, and the monthly character and distribution of the ice. The maps bring out with remarkable clearness the festoons of ice between the neighboring land masses; e. g. between Novaya Zemlya and Spitzbergen, between Spitzbergen and Greenland, and, in the winter season, between Iceland and Greenland.]

THALBITZER, WILLIAM. **Hos Östgrönlaenderne i Grönlands sydfjorde, naermest Kap Farvel, sommeren 1914.** Ills. *Ymer*, Vol. 37, 1917, No. 1, pp. 1-35. [Of the Greenlanders near Cape Farewell.]

SOLEY, JOHN C. ***Greenland. Blueprint copied from Meddelelser om Grönland*, Vol. 41, No. 1. *Danmark Expedition 1906-1908.*** 1:6,000,000. U. S. Hydrographic Office, New Orleans Branch, 1916.

SOLEY, JOHN C. ***North-east Greenland: Original Charts.*** 1:2,000,000. From *Meddelelser om Grönland*, Vol. 46, No. 2. Blue print. U. S. Hydrographic Office, New Orleans Branch, 1916.

MATHEMATICAL GEOGRAPHY

CARTOGRAPHY

—— **Portolan charts, Facsimiles of, belonging to the Hispanic Society of America.** With an introduction by E. L. Stevenson. 16 charts and 4 pp. of text. (Publ. Hispanic Soc. of America, No. 104.) New York, 1916. 25½ x 20.

This publication is epochal in the history of cartography and a credit to its author as well as to the Hispanic Society, which has done much in recent years to make available to scholars, in the best form, the muniments of the older geography. This society has brought together one of the finest collections of original portolan charts in existence and certainly the greatest in America. Sixteen charts, typical of the whole field were selected for reproduction. They are facsimiled by the exact gelatine process, twelve in monotones and four in colors in imitation of the originals. They are printed on heavy handmade paper; are accompanied by an introduction and cartographical data, written by the editor; and are enclosed in a buckram portfolio case.

Portolan charts were particularly designed for use by mariners engaged in coastwise navigation. They were to the known sea routes what the road maps were to the interior on land. As navigators explored new coasts and maritime discovery expanded from European ports to parts beyond the ken of men, the portolan charts grew commensurately in extent. Dr. Stevenson expresses their value as follows: "For the student of that early period, they possess a never-failing interest, and as geographical documents they have a value unsurpassed. They are the first modern sailors' charts, the first of modern charts scientifically constructed."

The earliest extant portolan chart was made in A. D. 1311, by Petrus Vesconte de Janua. The earliest chart owned by the Hispanic Society, reproduced in this publication, is attributed to Giacomo Giroldi and belongs to the early fifteenth century. The second reproduction is a chart by Petrus Roselli, 1468; there are eleven of the sixteenth century, and three later than the year 1600, ending with one by Cavalinni, 1637. Mostly, these charts depict the Mediterranean and portions of the Atlantic coast on either side of the straits of Gibraltar. They are on single skins of parchment or vellum. Sometimes they are found assembled in the form of a portolan atlas. For the period before the sixteenth century about one hundred of these charts are known; after that they become more numerous. In workmanship they have their origin chiefly in Italy and Catalonia. They were "drawn in plane projection, that is, all degrees of latitude and longitude were represented as having the same length."

Pictorially, these charts are interesting. A net-work of lines crosses them, usually in multiples of thirty-two lines, which radiate from eight to sixteen different points of the chart, but in a systematic order. In some of them these centers of intersection have

highly colored decorations with figures that are called wind or compass roses. Other charts are virtually specimens of the art of the illuminator, as, for example, that of Petrus Roselli, on which are castles, tents, animals, flags, etc.; or that of Jaume Olives (1566), with a representation of the madonna and child, large wind roses, etc., in many colors. Dr. Stevenson shows that there was some system in the application of the pigments. His analysis of the whole subject of portolan charts is the best succinct account of the subject that the reviewer has ever seen. VICTOR HUGO PALTSITS

STUART, E. R. **Topographical drawing.** ix and 128 pp.; maps, diagrs., index. McGraw-Hill Book Co., Inc., New York, Hill Publ. Co., Ltd., London, 1917. $2.00. 9½ x 6.

The European War has awakened interest in map reading, and our own entrance therein has accelerated the study and practice of map making. While numerous books cover the field-surveying end of the subject, topographical drawing has ususally been dismissed with a short chapter. Until the United States Geographic Board, in 1912, adopted standard conventional signs for the use of all map-making departments of the government, every topographer was a law unto himself.

Colonel Stuart has taken the next step and provided a text covering standards of practice which combine good execution with economy of draughting time. The first six chapters, comprising an introduction, map projection, instruments and drawing materials, plotting, special methods in free-hand drawing, and practice in topographical drawing, are intended largely for reference. In the next five chapters are illustrated and explained the various conventional signs. Map drawing is then taken up in the final chapter and is illustrated by a large plate in four colors. JAMES GORDON STEESE

BENNETT, T. L. **On the effect of map distortion on bearings and distances.** Diagrs. *Cairo Sci. Journ.*, No. 99, Vol. 8, 1914, pp. 257-262.

O'FARRILL, RAMON. **Problemas en el mapa.** (De un libro en preparación). *Bol. del Ejército*, Vol. 1, 1916, No. 3, pp. 219-235. Havana.

ZINGER (CINGER), N. J. **Sur les espèces les plus avantageuses des projections coniques.** *Bull. Acad. Imp. des Sci.* [*de Pétrograd*], Ser. 6, 1916, No. 17, pp. 1693-1704. [In Russian.]

CORRESPONDENCE

To the Editor of the "Geographical Review":

May I venture a mild protest against the review of "Principles of Aerography" (pp. 167-168, February issue), which appears more like an attack than a well-considered criticism?

Granted that a reviewer, if an instructor, has a right to express an opinion of the availability of a work for class purposes. No objection is made to the indiviuual view, which in this case is adverse; but it is fair to say that some good authorities have without solicitation expressed a view to the contrary. The present opinion is in a class by itself.

When, however, an instructor seriously puts forth the view that the use of modern scientific terms is confusing to a student, because older and inaccurate terms have been used heretofore, the statement must not go unchallenged. The reviewer objects to "aërography" and prefers "meteorology" and "meteorological." Now "aërography" is as logical as "geography" or "hydrography," and no mind of ordinary intelligence would be thrown into confusion by using it. There are good reasons, too, why "meteorology" should not be used in describing the structure of the atmosphere.

Again, the term kilobar, to which exception is taken by the reviewer, is in no way more difficult to comprehend than kilogram. In physics and chemistry a bar is a definite unit, the unit of pressure expressed in terms of force. It is the force which would give to one gram an acceleration of one centimeter per second per second. One thousand bars would naturally be a kilobar and a million bars a megabar. The hundredth part of a bar would be a centibar and the thousandth part, a millibar. The value of a millibar may be written .001 dyne/cm^2, or as 10^{-3} bar. We need such a value because in absolute manometers differences in pressure of this magnitude must be measured. Again, with modern condensation high-vacuu pumps, we operate with pressures as low as 10^{-5} bar, near the low limit of pressure. An instructor who proposes that his classes call a kilobar by the ancient name of millibar could with equal firmness insist that his students call a kilogram a milligram. Of course it would not be long before his students took him to task.

I make no comment on the rest of the review, which seems to lack coherency; but it may be noted that in one place the reviewer has failed to note the word *effective* in connection with the temperature of space and there is no contradiction such as he supposes.

Very respectfully,

ALEXANDER MCADIE